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VIEWS, NEWS AND INTERVIEWS.

The plans of the Pan-American Exposition which is to be held in Buffalo, N. Y, in 1901, are rapidly crystallizing. Naturally, electrical progress and development will be largely represented at this exposition, which it is expected will receive national sanction. The citizens of Buffalo have already subscribed a fund of $1,000,000 to insure the success of the exposition. Buffalo is the center of a section inhabited by 38,000,000 people, all of whom can go from their homes to the exposition in 14 hours. Mayor Maybury, of Detroit, recently made a trip to Buffalo and Niagara Falls to inspect the commercial possibilities of the Pan-American Exposition. Detroit, it will be remembered, is endeavoring to hold an exposition of its own during the same year. Mr. Maybury on his return to Detroit informed a daily newspaper that he has a plan to utilize the water-power of the Detroit River for generating electric current. He also stated that no dam would be required and that the water used in the power-plant at Niagara Falls was "led off in canals." It should be remembered, however, that the Niagara Falls plant represents an investment of between $6,000,000 and $7,000,000. Buffalo has already proved itself to be the electrical city of the United States, and its great natural advantages combined with the hustling abilities of the prominent citizens already connected with the Pan-American Exposition should certainly assure the success of the proposed exposition in 1901.

An old dam on the Susquehanna River, at Columbia, is being rebuilt, with the idea of converting the power thus developed into electricity. It is possible to obtain 11,000 horse-power there, but only about 4,000 will be taken at present.

Three independent sets of dynamos and engines, says our London namesake, are required to light her majesty's ship "Irresistible" (a first-class battle-ship, which was christened at Chatham dockyard on December 15), and to work the electric motor fans and the six powerful searchlights with which the ship is fitted. Every compartment of the vessel, except in the double bottoms, will be lighted by incandescent lamps, and Colomb's lights are fitted for use when the dynamos are not running. The ventilation will be secured by means of the motor fans. There is also to be a complete installation of electric bells and voice pipes, together with a system of loud-speaking telephones in various parts of the vessel. There is a steam capstan forward, but the after capstan is to be worked by two electric motors.

A dispatch from Havana says that Hallett Alsop Borrowe has been offered the general management of the Ferro Carril Urbano.

St. James's Hall, in London, is supplied with a fire pump operated by an electric motor. The pump is connected to the hydrant system, and enables jets to be thrown 40 feet above the roof at any time. The pump is placed in the basement, and a switch placed by each hydrant enables it to be started immediately from any part of the building.

Really, if the surface railroads and the telephones and the electric lights are to be consolidated in this fashion it will make them so strong that they will not feel the stroke of the legislative striker. And what will the poor statesman do then?—*Brooklyn, N. Y., Eagle.*

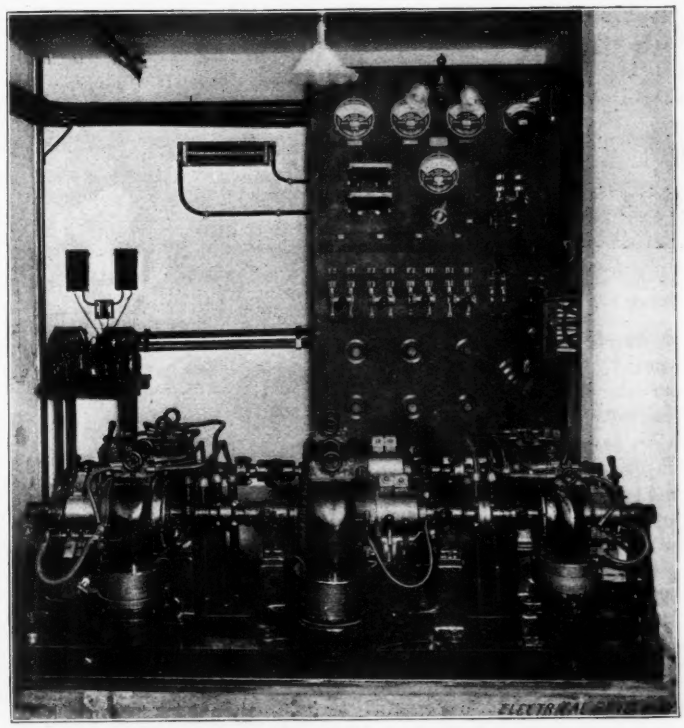

FIG. 1.—POWER PLANT IN THE NEW TELEPHONE EXCHANGE OF THE CENTRAL NEW YORK TELEPHONE AND TELEGRAPH COMPANY, AT SYRACUSE, N. Y.

The big iron stack of the Canton, Ohio, street railway power-house was blown down the other day by the high winds that prevailed at that time. The stack was about 100 feet high and was four feet in diameter. It was bent and twisted into several pieces.

Samuel A. Treat is preparing plans for the Western Electric Company for three buildings to cost $250,000, to be erected in Chicago on the block bounded by Clinton, Jefferson and Congress streets and Jefferson place.

THE NEW TELEPHONE EXCHANGE AT SYRACUSE, N. Y.

AN EXCELLENT EXAMPLE OF AN UP-TO-DATE TELEPHONE SYSTEM.

The Central New York Telephone and Telegraph Company opened its new telephone exchange at Syracuse, N. Y., with a public reception on Thursday last. The people of Syracuse were invited to inspect the new exchange and the whole telephone building during the day and evening. Competent members of the company's staff were present to explain the details of the business to the visitors who thronged the building from 10 o'clock in the morning until late in the evening. A number of prominent society women of Syracuse acted as hostesses and presided at a very enjoyable luncheon which was served to the company's guests.

The new telephone building is a substantially constructed five story building of pleasing design, located on Montgomery street, near East Fayette street. The windows on the two most exposed sides of the building are equipped with iron shutters which may be quickly closed by windlass and sprocket chain apparatus located at convenient points. The basement is occupied by a cable run, the power plant, the storage battery room, chief inspector's department, store rooms and a repair shop. The ground floor is utilized for business offices and a public telephone station, the second and third floors being occupied by the company's officers. The fourth floor is devoted to a lunch and retiring room for the operators, with cloak-rooms, lockers and bath-rooms for their use. The fifth floor is devoted entirely to the operating service of the exchange, and contains one of the most up-to-date switchboards produced by the Western Electric Company.

There are about 2,000 subscribers connected with the Syracuse exchange. The city has a population of about 130,000. This exchange is one of 10 operated by the Central New York Telephone and Telegraph Company, whose territory covers the counties of Oneida, Herkimer, Otsego, Delaware,

Chenango, Madison, Lewis, Jefferson, St. Lawrence, Hamilton and Onondaga, all in New York state. The largest exchange is that in Syracuse, while the next in size is that at Utica, with 900 subscribers. The company has about 4,000 subscribers in its territory. The average number of connections per day per station in Syracuse is 10.67. The company controls 3,900 miles of underground wires, 3,200 miles of overhead exchange connections, 4,330 miles of overhead toll lines and 1,831 miles of toll lines. The officers of the company are: President, Robert S. Williams; vice-president, Lewis H. Lawrence; general manager, Chas. A. Nicholson; secretary and treasurer, Francis G. Wood; general superintendent, Walter W. Nicholson; superintendent of toll lines, Geo. W. Wood. The total number of regular employés of the company, not counting solicitors, is 178.

The rates charged by the Central New York Telephone and Telegraph Company in Syracuse for metallic-circuit long-distance instruments are: Business houses, special or one-party line, $80; two-party line, $63; three-party line, $54; four-party line, $48, per year. Residence, one-party, $66; two-party, $54; three-party, $45; four-party, $39. These rates are for subscribers located within one mile of the central exchange. Those outside of this radius are charged a small mileage toll. There is also in effect a measured service system of rates running on a sliding scale, and varying from 500 calls on a four-party line at $30 per year to 1,300 calls on a one-party or special line at $77 per year.

Considering the flat rates and measured service charges mentioned above, a subscriber in Syracuse has a wide range of choice from which his needs should be easily satisfied.

An interesting feature of the long-distance service between Syracuse and Utica is that the commercial use of the lines is so great that it has forced the telephone officials to adopt a telegraph service for their own business communications. Consequently a composite telephone and telegraph service using the Pickernell apparatus has been installed, and all of the Central New York Telephone and Telegraph Company's own business between its headquarters in Syracuse and the headquarters in Utica is carried on by telegraph over the telephone wires. Expert telegraph operators are employed at each end of the line, and while the company's business is being transacted by means of Morse signals the commercial use of the telephone wire is not interrupted.

The system in vogue at the Syracuse exchange is the latest development of the common-battery return system, under which no batteries are required at the subscriber's station,

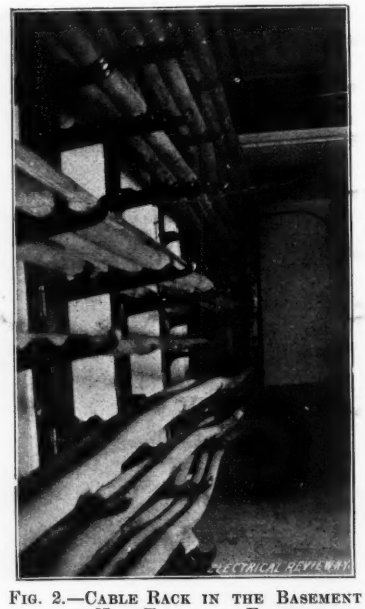

FIG. 2.—CABLE RACK IN THE BASEMENT OF THE NEW TELEPHONE EXCHANGE AT SYRACUSE, N. Y.

and the signaling to the exchange is effected by merely lifting the receiver from the hook on the subscriber's telephone. A number of auxiliary devices have been introduced on the Syracuse switchboard, which was installed under the supervision of Mr. Hammond V. Hayes of the American Bell Telephone Company's engineering staff.

The Central New York Telephone and Telegraph Company has at the present time in Syracuse 120,000 feet of underground ducts in subways, chiefly in the business section of the city. The subway system has a capacity of 5,000 miles of wire, and a present equipment of 2,800 miles of wire. The underground cables center in a manhole at the telephone building, and are carried out to distributing poles, from which they radiate to subscribers' stations. At the telephone building the cables entering the manhole are carried in a runway on specially designed racks to a fireproof cable shaft which extends from the basement to the operating room on the top floor. The iron stairway in the building runs around this cable shaft, which is formed of iron plates provided with doors at convenient points for purposes of inspection or repair.

The main distributing frame is located in the basement and is provided with current protectors and lightning arresters. The power plant is also located in the basement of the building and provides current for the entire telephone plant and replaces the batteries formerly used at subscribers' stations. Two Crocker-Wheeler motor-generator sets are here installed. One set is operated from a 500-volt power circuit connected with the street mains, and the other is operated by a 110-volt circuit supplied from a building about 1,000 feet distant from the telephone exchange. The object of having these two dissimilar sets is to provide against any possibility of a lack of current supply through breakdowns or any other accidental cause. These motor generators supply charging current for a storage battery located in a separate room, from which all current used in the exchange is drawn. A well arranged power switchboard provides

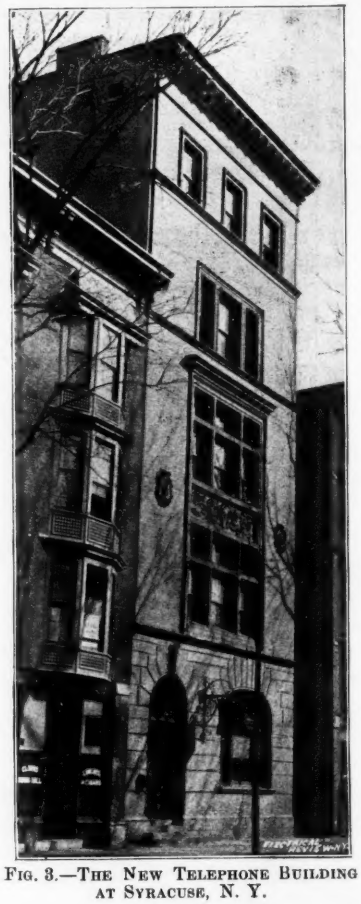

FIG. 3.—THE NEW TELEPHONE BUILDING AT SYRACUSE, N. Y.

means for quickly and conveniently handling the current supply. The wire chief's testing table is also located in the basement, and from here trouble tests are made direct.

In the operating-room on the top floor is a separate switchboard arranged with lamp resistances to control the current supply of the signaling and pilot lamps used on the switchboard. The lamp circuits are separate and distinct from the other sources of supply to the telephone switchboard.

The Central New York Telephone and Telegraph Company makes a special point of attending to subscribers' complaints thoroughly and promptly. For this purpose a special system has been devised and is now in successful operation. Its course is about as follows:

When a subscriber desires to inform the company of a defect in his service he calls for the "complaint operator." This operator is provided with a schedule showing 10 different kinds of trouble, each numbered, and covering all possible failures of the system. When a complaint is made, a three-part ticket is filled out by the operator giving the necessary facts of the case. One part of this ticket is retained by the complaint operator, who also fills out the part to be forwarded to the inspector. This part of the ticket contains a space for a report which must be returned with full particulars, and the signature of the chief inspector. The third part of the ticket comprises the chief inspector's check.

The complaint operator is provided with a card index, each subscriber to the exchange having a separate card, on which the main facts of trouble on each individual line are recorded. Every month the chief inspector goes through this index, and if a recurrence of trouble on any one line is apparent, or if the same kind of trouble on several lines is reported, the matter is investigated and a proper cure devised. It is a rule of the exchange that trouble complaints of all sorts must be reported as cured in 24 hours from the time a subscriber complains, otherwise the reports are referred to the general manager direct, who investigates the cause of the delay at once. Convenient means are provided for filing the various sections of the complaint tickets, so that those troubles which have not been properly remedied within the required time may be readily recognized and reported to the general manager.

In conclusion, it may be said that for an exchange of the size of the one just opened at Syracuse, it is probably the most modern and best equipped in the United States.

Prof. Alexander Graham Bell has recently returned to Washington, D. C., from Japan, where he spent several months.

American Institute of Electrical Engineers.

The 131st meeting of the institute was held at 12 West Thirty-first street, Wednesday evening, January 25. A paper was presented by Lieut. S. Dana Greene, of Schenectady, entitled "Electricity on Board Ship." It was discussed by Captain Millis, Lieutenant Walling, J. W. Lieb, Jr., T. C. Martin, Elihu Thomson, Townsend Wolcott and others. At the meeting of the executive committee in the afternoon the following associate members were elected:

Royal Bradford Daggett, electrical engineer Electric Storage Battery Company, Marquette Building, Chicago, Ill. Ernest I. Dyer, engineer and manager of the engineering department of the American Trading Company, Box 28, Yokohama, Japan. Geo. Henry Hill, chief engineer, elevator department, Sprague Electric Company, Bloomfield, N. J.; residence, New York city. Ernest Rowland Hill, electrical engineer, Westinghouse Electric and Manufacturing Company, Pittsburgh, Pa. Wm. A. Lynn, assistant in electrical engineering, University of California, Berkeley, Cal. J. Manly Simpson, assistant superintendent, Northwestern Grass Twine Company, post-office box 2513, St. Paul, Minn. Thos. Perrin Thompson, electrical laboratorian, Brooklyn Navy Yard; residence, 217 Cumberland street, Brooklyn, N. Y. Alfred J. Thompson, electrical engineer and contractor, San Ignacio 50, Havana, Cuba. Robert M. Wilson, student, McGill College; residence, 113 Shuter street, Montreal, Que.

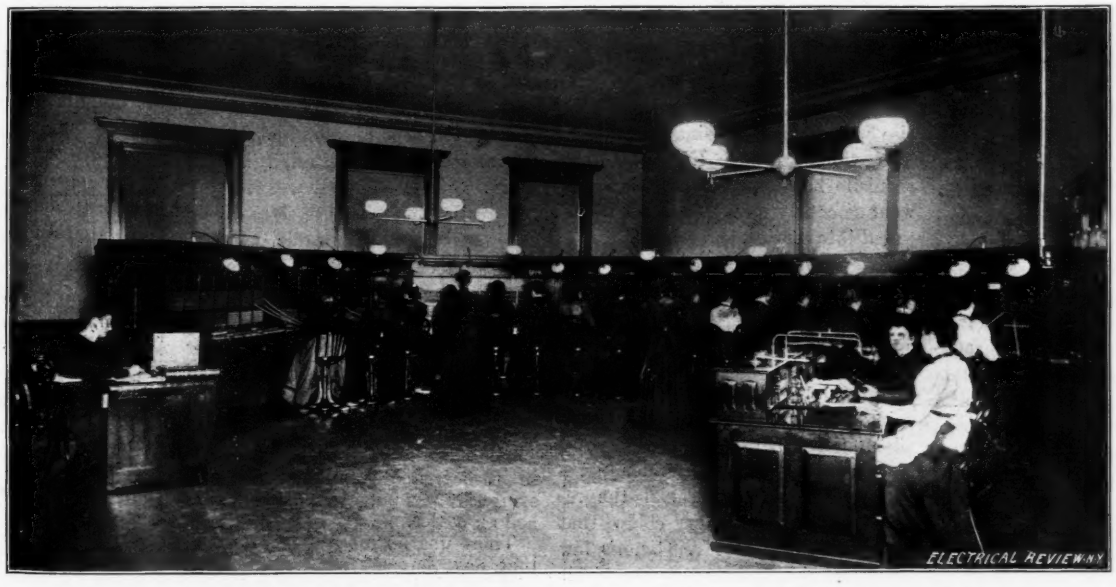

FIG. 4.—THE OPERATING-ROOM IN THE NEW EXCHANGE OF THE CENTRAL NEW YORK TELEPHONE AND TELEGRAPH COMPANY, AT SYRACUSE, N. Y.

The following associate members were transferred to membership:

Philander Betts, electrician, U. S. Navy Yard, Washington, D. C. Winder Elwell Goldsborough, professor of electrical engineering, Purdue University, Lafayette, Ind.

Scribner's Magazine for February brings forward several more of its attractive features for 1899. It is not a "war number," although it contains one of the most graphic things yet written about the war—the second installment of Governor Roosevelt's serial on "The Rough Riders."

Electricity at the Government Proving Grounds at Indian Head.

A large order for the necessary equipment of dynamos and engines and a system of surface contact railway has been secured by the Westinghouse company. It consists of two alternating-current generators of 300 horse-power each and one of 100 horse-power, and their Westinghouse engines. The current is to be used to operate Tesla induction motors—12 in number, aggregating 600 horse-power, and to light the residences of officers and the grounds and workshops.

Underground Extensions of Electric Lighting in Washington, D. C.

There is a bill before Congress providing for the discontinuance of all electric light wires within the fire limits within one year, the penalty to be a fine of $50 per day.

The bill also provides for an extension of the underground conduits, in such a manner that they shall form a *general* system at some future day. The United States Electric Light Company oppose the provisions of the bill that would enable the Potomac Electric Power Company paralleling the United States mains, thus opening competition to districts now served by the United States company alone.

Both the Potomac company and the business men's association want the measure to go through, but, after several hearings by a senate committee, amendments offered by the United States company are to be incorporated in the bill for the consideration of the district commissioners.

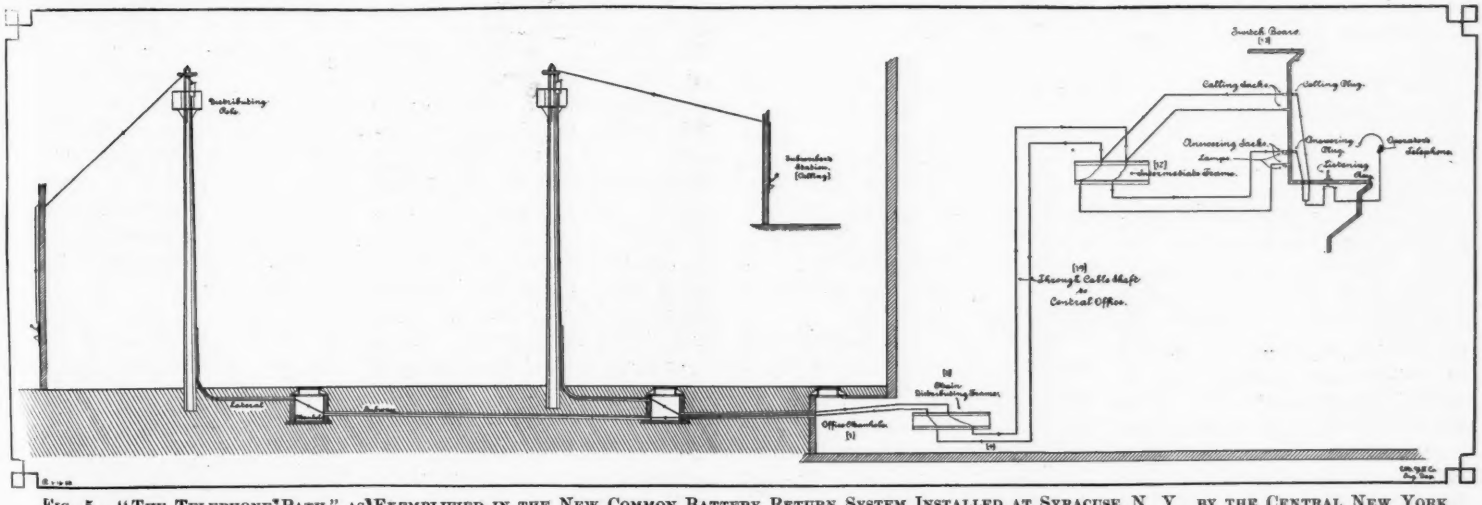

FIG. 5.—"THE TELEPHONE PATH" AS EXEMPLIFIED IN THE NEW COMMON BATTERY RETURN SYSTEM INSTALLED AT SYRACUSE, N. Y., BY THE CENTRAL NEW YORK TELEPHONE AND TELEGRAPH COMPANY.

DESPONDENT TREMLOW, *mournfully*—"Well, by gosh! This is the irony of fate for keeps. Here I've spent me last fifty cents ter commit suicide with gas, an' I git a room with 'lectric lights."—*Judge*.

Mr. G. Martin Brill, of the J. G. Brill Company, Philadelphia, is reported to be interested in the National Yucatan Southeastern Railroad, which will be built to develop the interior of Yucatan.

AN ADVENTURE WITH KEELY.

HOW MR. STEVENS INTERFERED WITH A TEST OF THE FAMOUS MOTOR, AND THE WRESTLING MATCH THAT FOLLOWED.

To the Editor of Electrical Review:

So much has been said and written concerning "Keelyism" during the last 25 years, and particularly since the death of Mr. Keely and his principal supporter, Mrs. Moore, that I rather hesitate in giving my one brief experience.

However, cumulative evidence is sometimes of slight value, and, so far as I know, I was the first one to completely block an exhibition and stop the Keely motor during a test run.

In the Spring of 1889 I was asked to accompany a party of gentlemen to the Keely laboratory for the purpose of witnessing an operative test of his motor. My age and experience at the time did not warrant my presence as an expert, so I joined the party in the capacity of an observer and listener. This was a line of work in which I had acquired considerable experience in connection with the investigation of spiritualism, and in this particular instance I was supposed to play my accustomed rôle of noting every word and act of the demonstrator without sign or comment, and then comparing the results of my observations with those of the others present.

You know the average man, on investigation bent, is a very poor observer of details, and it is wise to have present one person who is not investigating, but whose whole attention is devoted to observation pure and simple.

When we arrived at the laboratory we were ushered into the exhibition room on the second floor and assigned places of observation. Mr. Keely then gave us his usual introductory speech, in the course of which he impressed on us the honor he was conferring in permitting us to witness an exhibition of his own particular brand of force, a force which obeyed his laws and totally disregarded the old-fashioned and conventional laws of nature. We were then strictly enjoined to remain in the various places assigned to us under penalty of an immediate termination of the exhibition.

The usual demonstration followed, in which his motor, which was performing the arduous work of turning itself around without load, moved to right or left, slow or fast, and even at times stopped on receipt of proper notes from either a tuning-fork or violin. The motor did not seem to care which instrument drew the note of demand, provided the note was loud enough, and it was probably on this account that the violin was finally substituted for the tuning-fork. Under the guidance of the tuning-fork the motor balked several times; this, Mr. Keely explained, was due to the fact that the tuning-fork harmonics were not strong enough to control the polar or anti-polar flow, or the sympathetic outreach, or the something else which was vitalizing his motor. The violin seemed to possess the requisite harmonic strength, and all went smoothly for a time after it was called into service.

After a while I grew tired of listening, and concluded it was hopeless to try to remember a lecture which introduced about five words per minute that neither Webster, Worcester nor myself had ever heard before; so, being small and inconspicuous, I took advantage of a particularly long and eloquent peroration to wander just a little. First, I fell against the receiver and found it very cold; that made me think of Mr. Ganot's few brief remarks on the expansion of air and other gases. I realized, however, that I must not jump at conclusions, for Mr. Keely said his motor was operated by sympathy, and you know, Mr. Editor, how cold sympathy can be at times!

Finding that my explorations were only being followed by my friends, I ventured a little further and gently toyed with the "wire" which led the sympathetic vibrations to the receiver. It seemed to be just a plain, ordinary wire, constructed for business purposes only, but I was curious enough to wonder whether it differed from other wires which have no sympathetic duties to perform.

I argued that sympathy could reach out and exert its power through space, even though no wire was available, and, while I knew very little of Mr. Keely's particular brand of sympathy, I thought it would be a good time to test its wireless properties.

So, as I happened to have a pocket edition of side-cutters about me, I innocently cut the "wire." A quick hiss from it followed and the motor suddenly ceased to mote. Practically, simultaneously, Mr. Keely stopped his discourse and directed his exclusive attention and remarks to me. The latter was the only part of the lively demonstration which I clearly understood. I could not mistake their meaning and import, but a healthy respect for postal regulations prevents a verbatim report.

First, I tried to convince Mr. Keely that the cutting was accidental. He looked incredulous. Then I offered to cut the wire which connected the receiver with the motor just to see if the polarized and depolarized sympathies would not balance one another. I told him I was sure the motor would mote again if he would only let me try, and then if my theory was correct he could in future save the expense of wires. I explained that I had only cut off the action end of his sympathy, and if he would let me cut off the reaction end all might be well again.

I really don't believe Mr. Keely gave my arguments sufficient consideration. You see he had me folded close in his arms and was helping me swiftly downstairs at the time. One can't listen to reason very well while carrying even a medium-sized man down a flight of steep steps.

After the street door had closed on me I sat on the front steps and wondered why that wire had a hole in it; but, finally, remembered that sympathy was not available unless it had an outlet.

There was no more demonstration that day, but my associates agreed with me that, given a source of sympathy (such as an air compressor), there must be an outlet for the sympathy generated. Pent-up sympathy, you know, does no one any good and is liable to damage the holder thereof, and surely a fine strong metal tube makes an excellent outlet for sympathy—and a few other things.

J. Franklin Stevens.

Philadelphia, January 28.

Keely's Cylinder Not a New Discovery.

To the Editor of Electrical Review:

The remarks of "T. J. M." in your issue of January 25 concerning the new discoveries (?) concerning the Keely motor, or trick, prompt me to add a word in that direction. I certainly do not see that the learned men have made much of a discovery. But what I wish to say is in regard to the strong cylinder or globe, or whatever it may be, that is said to have been so carefully hidden. I remember distinctly that newspapers 10 or 15 years ago told of the making of such receptacles for the wonderful ether. There was *then* no secret about his using such appliances.

E. H. C.

New York, January 26, 1899.

Mr. J. George Kaelber, of Rochester, N. Y., was a New York visitor last week. Mr. Kaelber is largely interested in electric lighting and has a wide acquaintance in the electrical field.

Professor Goodspeed on the Work of the Keely Investigating Committee.

To the Editor of Electrical Review:

The letter by T. J. M. in your issue of January 25, headed "An Inquiry Concerning Keely's Air Pipes," would certainly call for no answer except for the lines near the beginning, "But it strikes me the discoverers who have dug up the floors of the old Keely shop have not quite redeemed their reputations for high-class work."

Since there is no question asked or implied in the whole letter, the "inquiry" element of the title is certainly without point and there remains nothing but the element of criticism.

Now criticism certainly is not objected to by either myself or my colleagues, provided only it is honest, just and based upon a full knowledge and appreciation of the facts in the case. Of course, I have no reason to doubt the sincerity of the letter, but it certainly lacks the merit of justice and this, doubtless, because the writer is not familiar with the facts. But why this ignorance if he read the original signed articles of the investigators; and why his letter of criticism if he did not read those statements?

What we object to most, perhaps, is the implication of the writer that we have at some time or other lost our reputations, and have as yet failed to regain them. This is certainly implied, since things can hardly be "redeemed" unless previously parted with.

Let me now refer to a few points of the criticism. T. J. M. says "Air or gas under pressure of 1,000 or 2,000 pounds per square inch could carry a lot of energy in a small pipe; but the energy could only be released into motion by allowing the air to expand in producing such motion. Such expanded air must have an outlet from the machinery to the atmosphere, unless a return pipe of very much larger bore carries it back to the compressor."

This may be true enough if we overlook inaccuracy of expression, but what, pray, has it to do with the case? Keely never expended "a lot of energy" in his experimental devices. He was always going to do so very soon, but as far as I know, never did, and never even pretended to. What he did was to make manifest what appeared to an observer to be the transmission of very great pressures, not "1,000 or 2,000 pounds per square inch," but 10 times as much, as in the case of the lever machine. Even this follows

only if one accepts the statements of certain insiders as to the detailed construction of the apparatus. However, assuming the high pressure, it acted through a very short distance only, *e. g.*, through a small fraction of an inch in the case cited, so that the work done was not at all great. Furthermore, the quantity of gas to be gotten rid of was very small, since the area of the piston acted upon was only about six-tenths of a square inch.

If T. J. M. will compute the potential energy contained in about eight cubic feet of air under a pressure of 20,000 pounds per square inch, he will see that a comparatively small engine could store it in a day or two, and that at the rate Keely used it, it would last a good while. This assumes that the high pressures mentioned actually existed. Nothing in our investigation makes this necessary—merely possible.

Our critic also says: "But the investigating committee do not seem to have found any trace of such returning pipe nor any way of concealing the necessary outlet for the exhaust." Here, again, he is wrong, though I can't understand why, unless the criticism was written without reading the report. Of the several tubes of various sizes and sorts that were found under the floors and in the walls, what was to prevent any one from serving in the capacity of "outlet for exhaust." None were actually connected with anything when we found them, and as for places for possible concealment, trap-doors, closets, pits and the like were only too numerous. In fact, it must be noted that, before the committee entered the place, the owners had removed all the machinery, and, to a hasty observer, the building was absolutely bare of anything that would suggest its former use. To put it stronger, practically all we did discover *was* concealed.

Again, your New York correspondent calls attention to specimens of very strong pipe of "years ago" which were shown "ripped open and burst." He says if his "memory is not at fault," these tubes were "of the best and toughest iron, three-fourths of an inch in diameter and about one-eighth-inch bore. . . ." Well, we fear his impressions *are* at fault, either about the size of the pipes or the method of bursting them. If T. J. M.'s specifications of the tubes are correct, how can he for one moment think that they were broken in any legitimate experiment on the part of Mr. Keely? Such belief involves actual conversion to Keelyism. Why, the bursting of such tubes would require an internal stress of from 100,000 to 200,000 pounds per square inch.

There is plenty of evidence that Keely had testing apparatus that would exert pressures up to, say, 30,000 pounds per square inch, but probably this is about the limit.

Referring to the last sentence of the letter we would note that, since "simplicity" introduces a sort of subjective idea at best, very likely our designs for a possible Keely system might not seem "simple" to T. J. M.

ARTHUR W. GOODSPEED.

University of Pennsylvania, Philadelphia, January 27, 1899.

Prof. Carl Hering Tells What the Keely Investigating Committee Found.

TO THE EDITOR OF ELECTRICAL REVIEW:

Your correspondent "T. J. M.," in your last issue, seems to think that those who conducted the recent investigation of what was left of the Keely laboratory after all the visible machinery had been removed, came to conclusions not warranted by the facts. As one of those who assisted in that investigation, permit me to say that I think he does them injustice, although his views may have been warranted by some of the incomplete statements which were published in some of the daily papers.

The principal things found were briefly as follows: A high-pressure sphere buried under the floor, with only a small opening at the top, provided with a screw thread; quite a number of pieces of small high-pressure tubes, and a number of these tubes in walls and ceilings laid in such a way that it showed conclusively that they were intended to be hidden.

From these facts, together with those obtained from witnesses of his experiments, any one can draw his own conclusions. The evidence is only circumstantial, but it seems to me, personally, that it shows as well as any circumstantial evidence can that he intentionally practiced deception, that he used something under high pressure other than a liquid and that he stored it. Moreover, the *tubes* found were recognized by personal witnesses of his experiments as being exactly like those which were claimed at the time to be mere *wires*. One piece looks exactly like that in a photograph of one of his machines, judging from the coupling and the kinks in it. A number of those who saw his experiments stated at the time that they could easily be explained if certain things which were claimed to be wires were really tubes. Keely once refused an offer of $10,000 from his best friend, Mrs. Moore, to allow one of the experts to cut this alleged wire.

From all this anybody may draw his own conclusions. Those drawn by the investigators were, of course, mere personal opinions, but personally I think most of them were warranted by the facts in their possession, some of which were not published at the time. The single conclusion that Keely practiced deception—which I think has been established beyond reasonable doubt—is in itself sufficient to expose him. What medium he used under high pressure may be of interest to some, but it is unimportant. A number of experts who saw the experiments, stated that if he used highly compressed air or other gas, his machines could be easily explained. A mere opening in some part of the apparatus would allow the exhaust to escape unnoticed, if it was air, and this exhaust, therefore, can hardly be considered an important "gap," as is claimed by your correspondent.

C. H.

Philadelphia, January 27, 1899.

What Park Benjamin Thinks about Mathematics at the Institute of Electrical Engineers.

TO THE EDITOR OF ELECTRICAL REVIEW:

Isn't it about time that the American Institute of Electrical Engineers provided a shelf of works on advanced mathematics, and restricted readers of papers mainly culled from them to a simple wave of the hand in the direction of the shelf, and the remark "There's my sentiments?" If it isn't, then, should not hereafter such papers as that of Mr. Carter on "The Design of Transformers" be read into a phonograph, to which the few people who particularly desire to listen to formula manipulation can resort at their convenience? The thing is getting ridiculous—and the Institute with it. Mr. Carter's paper monopolizes practically a whole issue of the transactions and extends over 60 pages, bristling with formulas. Look at pages 794 to 801 inclusive, devoted to nothing but juggling with equations.

If Mr. Carter's paper resulted in information of material importance, perhaps this needless exhibition of mathematical ground and lofty tumbling might be silently tolerated, but if we are to credit the expressed opinion of the members taking part in the discussion, its value is, to say the least, problematical.

Professor Pupin says:

"On the whole, I do not think that this paper will lead to anything that could be used as a standard for all cases," and he sees no better use for it than as a convenient shunt for inquiring students who put disagreeable questions to "college professors of limited experience in transformer design" who do "not care to display their ignorance before the student."

Nice confession for a Columbia professor! Creditable one to a member of the committee which presumably admitted the paper!

Then here is Mr. Walter S. Moody, speaking as "one who is actively engaged in everyday practical design," who informs us that "it would be perfectly possible to apply the formulas developed by Mr. Carter, and which in themselves are undoubtedly perfectly correct, and yet obtain a design entirely impractical;" and that "considerations, which are in one sense purely details of shop practice or skill in workmanship, may modify the results to such an extent as to entirely outweigh the consideration of best theoretical proportions."

The president of the institute remarks that "after all such rules have been taken into account, the method of trial and error must always be depended upon in arriving at the best design of a transformer at the present time," and finally, Mr. Henshaw considers it "somewhat questionable whether the formulas could be followed in practical work with entire success."

The main useful deduction to be drawn from both paper and discussion seems to be that something is the matter with the Committee on Papers and Meetings.

PARK BENJAMIN.

203 Broadway, New York, January 26, 1899.

Electric Lighting in the Paris Chamber of Deputies.

The electric light has been installed at the Chamber of Deputies in Paris, by MM. Jean and Bouchon, under the direction of a commission presided over by M. Mascart, the well known electrician. There are 4,610 lamps in all: 1,440 in the various parliamentary services outside the Chamber itself, 2,640 in the Hotel de la Presidence and the Grand Salon, and 530 in the rooms. The Chamber itself is not lighted yet, because a new and much larger one is in course of construction. Gas motors are employed to drive the dynamos, and a battery of Tudor accumulators is used to store the current. The gas motors are started by sending a temporary current through the dynamos from the accumulators, after the method introduced by Mr. Swan, on the suggestion of Lord Kelvin, at his private house, Lauriston, in Kent, Eng.

Electrical Review

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CONTENTS.

Views, News and Interviews ... 65
The New Telephone Exchange at Syracuse, N. Y. ... 65
American Institute of Electrical Engineers ... 67
Electricity at the Government Proving Grounds at Indian Head ... 67
Underground Extentions of Electric Lighting in Washington, D. C. ... 67
An Adventure with Keely ... 68
Keely's Cylinder Not a New Discovery ... 68
Professor Goodspeed on the Work of the Keely Investigating Committee ... 68
Prof. Carl Hering Tells What the Keely Investigating Committee Found ... 69
What Park Benjamin Thinks About Mathematics at the Institute of Electrical Engineers ... 69
Electric Lighting in the Paris Chamber of Deputies ... 69
Air Vehicles ... 70
Wall Street and the Electrical Stock Market ... 70
Our Chicago Letter ... 71
Automobiles in France ... 71
New Books ... 71
Personal ... 71
The Fort Wayne Electric Corporation ... 71
University of Minnesota Notes ... 71
Practical Application of the Electric Motor to Printing-Press Machinery ... 72
Gloistein and the Electric Fish ... 72
A New Graphite Company ... 72
Electric Railway Notes ... 73
A Direct-Driven Multipolar Dynamo ... 73
Rapid Transit in the Wilds of New York ... 73
The Fire and Police Telegraph Superintendents' Association ... 73
Latest Progress in the Application of Storage Batteries ... 74
Electrical Vehicles at the Bicycle Exhibition ... 75
Large Carbon Contract ... 75
Telephone News and Comment ... 76
Literary ... 76
Obituary ... 76
Manufacturing Notes ... 76
Electric Light Flashes ... 77
Telephone Companies Earnings ... 77
A Telephone Exhibit ... 77
Electricians and Beefsteak ... 77
Electrical Progress in Japan ... 77
Advance Information ... 78
Electrical Patents ... 79
Kindred Interests ... 80

Advertisers' Alphabetical and Classified Index on page xiii.

For the 11 months ended November, 1898, the United States exported $2,276,197 worth of electrical machinery as compared with $661,581 in 1897.

Mr. H. E. Clifford and Mr. J. S. Smyser have recently made some experiments at the Rogers laboratory of physics in the Massachusetts Institute of Technology at Boston, on the photometric properties of the acetylene gas flame. The experiments were quite elaborate in character and were carefully carried out. The conclusions reached are briefly stated as follows: "We are not inclined to the use of the acetylene flame as the standard of light."

General Abbott, who lately arrived from Paris, has been going about throwing cold water on the Nicaragua Canal scheme. He believes in the Panama ditch. It is no use to repeat his figures here. Let him and his Frenchmen go ahead with and talk about Panama, but let us set to work in Nicaragua. The Panama Canal has been the grave of men, of millions and of reputations, and will swallow up many more if its construction is taken up again. To work!—*The Criterion, New York.*

We wonder if this is our old friend under whose engineering management millions were sunk in a Boston underground hot-water supply scheme? If the same General Abbott we should doubt his ability to throw "cold water" very effectively on any engineering proposition.

A novelty is promised at the next series of banquets of the alumni of Massachusetts School of Technology. The guests at the various tables in different cities are to have an *entrée* of telephones, by which means a man at the St. Louis banquet can listen to the clinking of the glasses and the gurgle of the Burgundy at the Boston tables. A very pretty idea; but why stop half way? Why not have another *entrée* of transmitters, so the Boston man can call his chum in Chicago and clink glasses with him, and thus round out the scheme?

We are glad to note that one experimentalist is starting out to observe the temperature of the air at considerable elevations by means of kites. After awhile the practice will become more general, and we hope to see the day when the United States Weather Bureau will have a system of captive balloons aloft, keeping a continuous record of changes of temperature pressure and humidity. Until something of the kind is done, the service will not attain the rounded completeness expected at the time of its original installation.

AIR VEHICLES.

The famed Elysian Fields will be nothing but a back-yard compared with what our metropolitan streets and avenues are to become when the Autotruck company and the Prall syndicate have done with their vast work of improvement. All rough pavement is to be done away with and asphalt is to reign supreme. The clatter of the horse is no longer then to be heard. Our morning slumbers are to be no more disturbed by the pounding of the steeds used by "butcher and baker and candlestick-maker," but are to be as the noiseless sawdust path in the circus. And all this is to be accomplished by a little compressed air "directed through cylinders to drive piston-rods just as they are driven by steam in the ordinary locomotive." How simple! What can not a little wind do, by way of booming stocks and preparing the way for gigantic paving contracts?

For, of course, the streets must be made ready for the triumphal advent of the autotruck, whether the latter is blown upon them by the wind of the Autotruck company or the wind and water of the Prall syndicate. The electric cabs came on the streets quietly, took them as they found them, and silently attended to business. They had no heralding or blowing of horns or bellowing of stock quotations. Their owners had the courage of their convictions and put their own money at work, produced the cabs, and the doubters and scoffers were silenced. It would be well for the wind-motor people to go and do likewise, but we hardly expect them to undertake the herculean task just yet. They know better.

The latest project for developing electric current by water-power at Niagara Falls contemplates the erection, at the Whirlpool Rapids below the Falls, of a 35,000-horse-power plant to cost $2,000,000. The principal feature of the scheme is to utilize five per cent of the water flowing through the rapids by bringing it through a canal to be built inside the tracks of the "Gorge" road. It is stated that the flow of the water at this point is at the rate of 21.75 miles per hour. Mr. John Birkenbine, president of the Franklin Institute, of Philadelphia, has been commissioned to prepare the plans for the project for the New York and Buffalo capitalists who are interested.

The New York State Railroad Commission is endeavoring to secure the equipment of electric and cable cars with power brakes. In view of the great weight of modern street-railway cars and the increased speed under which they run, the commission is of the opinion that the old style hand brakes are insufficient to properly control the cars. It is stated that the commission has called upon inventors to prepare for a public test, to be given under the auspices of the commission on one of the Metropolitan Street Railway Company's lines, in New York city, at a date to be fixed. This should prove to be a great opportunity for inventors and manufacturers of electric and air brakes.

WALL STREET AND THE ELECTRICAL STOCK MARKET.

Again have the daily transactions for the week in Wall street surpassed all records of activity. There is no sign of abatement of interest in the market, and the dealings of the general public are apparent. Many brokerage houses were compelled to turn away orders during the week just closed for lack of facilities to handle them. Over 7,000,000 shares of stock changed hands on the New York exchange during the 5½ business days of the week. The dealings in bonds approached $37,500,000 par value. The weekly trade reports show no abatement of the domestic and foreign trade of the country.

On the New York exchange there was an exceptional and marked rise in Metropolitan Street Railway, the latter gaining 18¾ points, the closing prices being 216½ bid and 217¼ asked. General Electric closed at 111 bid and 111½ asked, a record price for the stock and a gain of 9⅜ points for the week. Edison Electric Illuminating of New York closed at 195 bid and 196½ asked, a loss of 2½ points for the week. On the Boston exchange American Bell Telephone closed at 308 bid and 310 asked, a gain of 4⅞ points for the week. Erie Telephone closed at 90 asked and no bid price. On the Philadelphia exchange Electric Storage Battery common closed at 78 bid and 78¼ asked, a gain of 4⅛ points for the week. Electric Vehicle closed at 24 bid and no asked price.

Wall Street, January 28, 1899.

OUR CHICAGO LETTER.

One of the most important events of the week was the passing of the ordinance by the City Council to the Illinois Telephone and Telegraph Company, granting a 50-year franchise to operate a telephone system in Chicago. The company, which will enter into competition with the present system of the Chicago Telephone Company, have practically cut the rates of the Bell company in two, charging a yearly rate of $85 for business houses and $50 a year for residences. The franchise, as granted, gives to the new company the right to use all the streets and alleys in the city, with the provision that all wires in the district bounded by Fifty-fifth street, Western avenue, Fullerton avenue and the lake, are to be put under ground. The company gives the free use of telephones to the different city department offices, excepting the offices used for fire and police service, which will pay the nominal charge of $5 a year. The civil service commission offices being excluded, will have to pay regular rates. The ordinance was put through by "the gang", and it differed materially from the street railway franchise, on which they stood divided. Alderman Novak introduced the ordinance, led it all the way through, and it was finally carried by a vote of 46 to 13. Several amendments were made, one to cut down the term from 50 to 40 years, one to amend the first section which allowed "wires or other electrical conductors to be used for the transmission of sounds, signals and intelligence by means of electricity or otherwise." It was claimed by one alderman this would give the company the right to put in pneumatic tubes to be used as carriers or for the transmission of mails. These amendments were all defeated, however, and the ordinance passed.

It is said that the new company has the backing of the Anhauser-Busch Brewing Company, of St. Louis, and several large Chicago packing-houses who do a telephone business which amounts to hundreds of thousands a year. It is the intention to make combinations with other anti-Bell companies, and operate long distance telephones through the West.

It it said the Mayor will not try to force the payment of a heavy compensation at the present time, but after the company is thoroughly established he will insist that it pay the city 10 per cent of the gross receipts.

An order was placed with the Everett-King company, 273-275 Canal street, Chicago, by the Atchison, Topeka & Santa Fé Railroad for nine horseless carriages. The contracts call for three large coaches, to cost $4,000 each, and six smaller ones. A 14-horse-power gasoline engine will furnish the motive power. The vehicles are to be used in transporting sightseers from the Santa Fé station at Flagstaff, Ariz., to the canyons of the Rocky Mountains. The inventor, A. W. King, claims these engines can ascend the steep mountain grades easily. Each of the coaches will be furnished with all the accommodations of a tally-ho. The machinery will be hidden in a box over the rear axle. The wheels will be provided with rubber tires six inches in width.

F. E. C.

Chicago, January 28, 1899.

Automobiles in France.

United States Consul-General Gowdy, of Paris, in his annual report says:

During the past year there has been a marked increase in the adoption of automobiles, not only as pleasure vehicles, but for practical application in the way of cabs serving the public in the city of Paris, and for business purposes in the way of delivery wagons, especially those for long distances. It is announced that at the beginning of next year there are to be 100 motor cars driven by electric power running in the streets of Paris, and, if the experiment be successful, the cabs will be increased to 1,000.

With this project in view a large plot of ground has been acquired, where the building of works necessary for the housing of the cabs and the machinery for the electric supply are being rapidly completed.

A training ground has also been made for the cabmen. This is laid out with every possible form of paving—wood, asphalt, stone, etc.—including two steep hills. Here and there are dotted about a number of dummy figures, and in and out of these the cabmen have to maneuver, under the orders of an instructor. As a rule, in four lessons, it is stated, the driver is ready to navigate Paris, and after ten lessons is considered thoroughly competent. Each cab is supplied with sufficient power to be driven 30 miles at about eight miles an hour.

Among the systems of automobiles in Paris there are many using essence and petroleum, which called forth a most pronounced objection from the public by reason, first, of the odor following their passage; second, the noise; and third, for the passengers, the extraordinary vibration. A consummation of great value would be a machine which would combine durability, speed and economy without these annoyances and defects.

NEW BOOKS.

We have received from Secretary Porter the bound volume of proceedings of the National Electric Light Association's twenty-first convention, held at Chicago last June. An excellent half-tone portrait of ex-President Insull forms the frontispiece of the volume, which is handsomely printed and substantially bound. The work is from the press of the James Kempster Printing Company, of New York city.

The "World Almanac" for 1899 is one of the best volumes in the long series of that interesting publication. Detailed and authoritative information of the Spanish-American war occupies a prominent place, and an interesting review of the electrical progress for the past year is given. As usual, the tables of statistics are accurately and conveniently prepared. As a handy reference book the "World Almanac" has no superior.

PERSONAL.

Mr. Edward J. Fenlon, formerly with the National Conduit and Cable Company, Times Building, New York city, is now vice-president and general manager of the Acme Acetylene Gas Company, 52 Broadway, New York city.

Mr. Geo. A. McKinlock, president of the Central Electric Company, visited New York last week and attended the Admiral Sampson dinner at the Montauk Club. Mr. McKinlock is well pleased with the very encouraging outlook for the electrical industry during 1899.

Mr. Chester D. Crandall, general manager of the Western Electric Company, of Chicago, left last week for a visit to the City of Old Mexico, and will enjoy a deserved rest of about three weeks. Mr. Crandall was for many years secretary and treasurer of the Missouri & Kansas Telephone Company, resigning to enter the manufacturing business as the executive head of the Western Electric Company at Chicago. His work there has established him as one of the progressive and successful electrical manufacturers of the day.

The Fort Wayne Electric Corporation.

A statement from Fort Wayne, Ind., is to the effect that the Fort Wayne Electric Corporation will probably be put into bankruptcy, and a petition to that effect has been filed. The recent sudden death of Mr. R. T. McDonald, who had been at the head of the company since its organization, left the affairs of the corporation naturally somewhat tangled, and its assets and liabilities are reckoned at about $700,000 and $900,000 respectively.

It is believed that the company will be reorganized on a sound basis and its large manufacturing interests protected.

University of Minnesota Notes.

Among the recent non-resident lecturers before the College of Engineering of the University of Minnesota are two well known engineers. On January 24 Mr. J. J. Carty, chief engineer of the New York Telephone Company, gave a lecture on "Telephone Disturbances." The sources of the disturbances upon telephone lines were discussed in an able and intensely interesting manner with the aid of numerous diagrams. Special attention was given to the problems presented by the increasing use of high-tension alternating currents for power transmission and their effects upon telephone circuits, illustrations being drawn from experience of the telephone lines in Minneapolis and St. Paul with the 3,750-volt and the 12,000-volt three-phase circuits of the Twin City Rapid Transit Company and those of the Minneapolis General Electric Company.

On January 26 Mr. Truman Hibbard, general manager of the Willow River Electric Light and Power Company, of Hudson, Wis., lectured upon hydro-electric power plants, discussing certain features of three-phase and monocyclic systems for transmission and distribution purposes. Mr. Hibbard gave an interesting account of the power plants under his charge, showing the great flexibility of electrical apparatus. In two cases the power plant is reinforced by 600-volt direct-current motors, driven by generators at other waterfalls not far distant; in one case the distant wheel and generator being controlled from the principal station. He described a novel arrangement of secondaries by which a monocyclic generator may be used in emergency to supply three-phase circuits through the regular transformers.

The electrical engineering museum has recently been enriched by a number of pieces of station auxiliary apparatus secured from the Minneapolis General Electric Company, showing various stages in the development of lightning arresters and switchboard apparatus.

A Heisler two-phase alternator recently secured from the Mankato Gas and Electric Light Company is being modified for experimental use, a system of switches being arranged to permit easy and rapid changing from 100 volts to 1,000 volts at will, also enabling the use of both pressures at the same time.

Mr. George Urban, Jr., of Buffalo, a leader in matters electrical, progressive and political, was a New York visitor last week. Mr. Urban is greatly interested in the success of the Pan-American Exposition.

Practical Application of the Electric Motor to Printing-Press Machinery.

Mr. W. H. Tapley, of the United States Government Printing Office, Washington, D. C., read a paper before the electrical section of the Franklin Institute at its stated meeting of Tuesday, January 24, on the above subject. The speaker said, in substance:

During the past five years, the electric transmission of power has made most rapid strides. Aside from long-distance transmission and railroad work, we can safely say that the individual motor application to machinery stands in the first ranks.

There are no statistics giving the aggregate horse-power now used for this purpose, yet it is safe to assert that no one branch of machinery can show the results in power saved, improved product and increased output from the application of the electric motor as printing machinery.

The printer demands that all the good features of the belt drive, as to power and convenience of handling, be retained when the individual electric motor is substituted for belt power.

That nothing be sacrificed in economy of operation and completeness of outfit, it is necessary that care be exercised in the selection of the type of motor, method of control and attachment.

If this is to be done, the first step consists in becoming familiar with printing-press work, studying closely the mechanical features of the press to be equipped; then, and not until then, are we ready to take up the electrical end.

Of the series, shunt and compound motors, the latter gives the most satisfactory results.

Belted, geared and direct connected motors can be used, though only geared and direct are distinctly advantageous over belting from main line shafting. The selection as to which is better must be decided in each individual case. Control of press must be positive as to handling under all conditions and providing a suitable range of speed. Where possible, arrange presses to operate at a uniform rate of speed, doing away with the demand for wide extremes, which are rarely used.

Of the various methods of control for direct motors, a combination of armature and field control is best. Armature control with carefully proportioned gearing, in sizes up to five horse-power, is a dangerous rival of direct motors. All individual motors should be so attached to frame of press as to be practically part of it; separate motor foundations are a failure. Geared motors should be supplied with rawhide pinions having brass sleeve and sides, always using single reduction. Ratios of ten to one are permissible where press speed is not over 120 revolutions per minute; five and three to one where speed is 175 revolutions per minute and upwards.

Direct motors should be used where noise is an objection, as well as on all large presses, especially for newspaper work.

Each equipment should be provided with an automatic circuit-breaker—one that will protect the press while looking after the motor. This is an absolute necessity if we obtain all the advantages of the individual drive.

Cost of direct versus geared press equipment, for new presses, is 25 to 33⅓ per cent more for the former. Where old belted presses are to be changed with conditions equal, the cost is about the same; the gearing with fixtures amounting to difference in cost between motors. This applies to five horse-power motors and larger; smaller sizes may cost very much more, sometimes double.

General advantages secured by substituting individual electric drive for belting are economy of power, positive speed applied direct to main driving shaft of press, ability to locate press without reference to main line of shafting, freedom from dust and dirt, higher grade work and increased output, which should amount to 15 per cent without extra wear on machinery. This will easily pay for the electric equipment within three to five years.

As a reliable method of power application the electric motor is without an equal, for when properly designed as to its work, supplemented with substantial attachment, the repairs are practically nil.

With flat bed presses, printing 32 pages, 16mo, per impression, an average product can be secured, including all allowances for "making ready" and handling paper, of 21,000 per kilowatt hour. With price five cents per kilowatt hour, 4,200 pages can be printed for one cent.

Web presses doing same class, size and grade of book-work will print, cut and fold 91,000 pages per kilo watt hour; taking same price, 18,000 pages are printed for one cent. A comparison shows a balance of four and one-half times in favor of the web presses.

When large number of presses are in use, a safe ratio of five and one-half to one can be as horse-power in motors to horse-power in generators installed.

Gloistein and the Electrical Fish.

August J. Gloistein, president of the Gloistein Fishing Club, was alone in his saloon at Grand and Essex streets on Wednesday afternoon when two well dressed young men entered.

"Mr. Gloistein, I believe," said one of the men.

"Yes, sir, I vas der man," replied Gloistein.

"We believe you are interested in piscatorial divertisements?"

"Vat is dot?" asked Gloistein.

"We understand that you are interested in fishing," said the men.

"Yah, I go fishing," said Gloistein.

"Would it not be a grand idea to have something representing a fish in your show window?" asked the other man.

"Dot vould be a good idea. Do you mean a live fish?" asked Gloistein.

"No, you don't grasp our meaning," said one of the men. "We mean something in the nature of an insignia. Something symbolic of Walton. Something that would designate your place as, for instance, the 'Bell in Hand' or the 'Bird in the Bush' or the 'Fish on the Hook.'"

"Vat monkey pizness are you speaging mit me?" asked Gloistein.

"I will explain more fully," said one of the men. "I am the representative of the National Illuminated Electrical Advertising Device Company. We put up signs of a unique nature with electrical attachments which light it up at night. Wonderful and startling results follow. I will illustrate. Pat Coleman, of the Kerryman's Association, who, I understand, is a friend of yours, allowed us to put an electrical harp in his window. It was made of green glass. At night he turned on the electric lights inside and it showed a large green harp in his window. Now his saloon is known far and wide as 'The Harp,' and he gets business all over on account of it."

"Dot vas a grand idea, but I don't vant to buy any harps," replied Gloistein.

"You don't have to pay anything for it, and you don't have to take a harp," said the man. "We make the idea fit the place, don't you see? Instead of you having to buy anything, we pay you $20 a month for the privilege."

Gloistein immediately commenced to evince an interest in the scheme.

"Now," the man continued, "we will make a huge glass fish. The glass will be made of colors to correspond with a codfish. Inside the glass fish will be the little incandescent lamps. We will have a thin glass tube leading to the mouth of the fish and a glass fishhook. The tube will represent the line. The hook and line will both be lighted. You can then have your hotel known as the 'Fish on the Hook.' We get our pay for the device by attaching to the fish the advertisement of some of the mercantile houses with which we have contracts."

"Dot is all righdt; I vill go you," said Gloistein enthusiastically.

"Let's see; we must get the measurements of the outside window of the frame," said one of the men, addressing the other. The men and Gloistein then went out on the sidewalk. Gloistein was asked to hold one end of a tape line and mark down the figures as they were read to him. He became very much interested in the measuring process and did not notice that one of the men had disappeared.

"That will do, Mr. Gloistein," said the man as he wound up the tape. "Now, the sign will be here to-morrow. Good-by, Mr. Gloistein."

Gloistein went into his saloon and a few moments later, when he opened the money drawer, he commenced to yell "Bolice! Murder! Vatch! Tieves!"

While he was measuring the front window one of the advertising promoters had gone into the saloon and stolen $28 out of the money drawer.

"Oh, vot a fool I vas!" shouted Gloistein to the crowd which ran into the store in response to his cries. "An electric fish, hey! A fish on der hook! I vas der fish on der hook! I swallowed der bait! I'm no codfish, neider! I am a sucker, yah! I vas vorse dan a sucker! I vas a lobster!"

Gloistein then summoned his barkeeper, who was upstairs eating his dinner.

"John, John!" he cried. "I am going out to do some more detective pizness. I vill catch der electric fish man. Vat luck I vas getting." He then secured his German army pistol and started out in search of the swindlers.—*New York Sun.*

A New Graphite Company.

The Acheson Graphite Company has been formed under the laws of New Jersey to manufacture graphite. The headquarters of the company will probably be at Niagara Falls, N. Y. Prof. E. G. Acheson, the scientist and inventor of carborundum, is at the head of the company, and associated with him are Geo. R. Rayner and K. K. McLaren. The capital of the company is $1,000,000.

ELECTRIC RAILWAY NOTES.

The Keyport, N. J., & Matawan street-car line has been sold to John Karr and others. The company will establish an electric light system in Keyport next April and install a trolley line.

At the first annual meeting of the Sauquoit Valley, N. Y., Electric Street Railroad Company officers were elected as follows: President, A. P. Seaton; vice-president, Granville W. Williams; treasurer, B. C. Divine; secretary, C. H. Philo.

The annual report of the Oneida Street Railway Company for the quarter ended December 31 last shows: Gross earnings from operation, $1,056.65; operating expenses, $812.75; net earnings from operation, $243.90; interest, $85; taxes, $35.10; net earnings, $123.20.

Boston capitalists, represented by W. A. McMansur and W. E. Reed, have filed a certified check for $10,000 with the City Clerk of Boulder, Colo., as a guarantee to build an electric road through the streets of that city, and also to the Chautauqua Grounds in the suburbs.

The Dayton, Ohio, & Western Traction Company, owning 25 miles of track and numerous cars and a power-house, has sold its interests to Valentine Winters, J. H. Winters, C. B. Cregg and D. B. Corwin for $400,000. The stock was held by the Central Trust Company, of New York. The line extends from here to Eaton.

At a recent meeting of the stockholders of the Middletown, Pa., Highspire & Steelton Electric Railway Company the following officers and directors were elected for the ensuing year: President, G. W. Cumbler; directors, E. C. Felton, Edward Bailey, J. E. Rutherford, S. C. Young and Solomon Zimmerman. A semi-annual dividend of five per cent was declared.

At the annual meeting of the stockholders of the Fort Plain & Richfield Springs, N. Y., Railway Company the following were elected directors: Chas. Seidler, James G. Janeway, J. C. Holden, Robert D. Farlee, Horace Moody, A. M. Farnum, W. I. Kent, New York; Andrew R. Smith, Springfield Centre; Warren Hawn, Starkville. The inspectors of election are: Alex. Smith, Starkville; Abram Devendorf, Fort Plain; C. D. Gretchell, Richfield Springs.

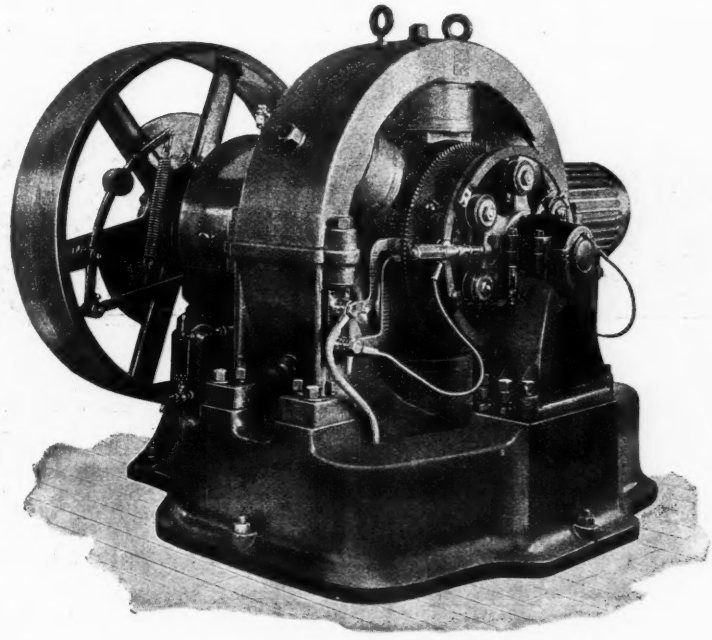
At the annual meeting of the Cleveland, Ohio, Painesville & Eastern Electric Railway officers and directors were elected as follows: President, C. W. Wason; vice-president, J. A. Beidler; secretary, I. S. Barton; treasurer, E. W. Moore; directors, E. W. Moore, C. W. Wason, H. A. Everett, I. N. Topliff, Fred Storm, W. S. Carr and J. A. Beidler. As previously announced, the capitalization was increased from $1,000,000 to $1,500,000 to support the bond.

A press dispatch from Baltimore, Md., states that the representatives of the street car lines of that city have signed an agreement whereby the syndicate headed by Alexander Brown & Sons secures control of every line in the city. The syndicate had already purchased the Baltimore City line and the Baltimore Northern. It now secures the Consolidated Traction Company. The agreement gives to the syndicate the right to purchase the stock of that company by March 30, and pay for it either in cash or in securities of a new corporation by April 30. The price agreed upon is $37.50 a share, and the stockholders may elect to take cash or the new securities. The amount involved in the deal, whereby the Brown syndicate obtains control of the united lines, is $26,000,000.

The Illinois Telegraph and Telephone Company has been granted a franchise by the Chicago City Council for 50 years without compensation to the city. Business telephones are to be furnished for $85 a year and residence $50.

A Direct-Driven Multipolar Dynamo.

In an illustration herewith is shown a 100 kilowatt direct-driven multipolar dynamo manufactured by the Western Electric Company, of Chicago and New York. The frame of this machine has four poles and is of the octagonal type with the yoke cast separately from the pole-pieces. The pole-pieces are wrought iron forgings bolted to the yoke and projecting radially inward. This is the construction of the sizes from five to 50 kilowatts. All sizes greater than 50 kilowatts have six poles, having circular yokes with wrought iron pole-pieces as shown in the illustration.



A 100-K.-W. DIRECT-DRIVEN MULTIPOLAR DYNAMO.

The frame is bolted to the extended engine sub base in such a manner as to allow adjustment both horizontally and vertically. When properly adjusted it is held rigidly in position by large bolts; this gives a uniform air gap and does away, it is claimed, with all possibility of having an unbalanced magnetic field.

The armature is of the ironclad type, having copper bar conductors imbedded below the surface in insulating tubes and connected at the ends by spiral end connectors. No band wires are used. The insulating tubes are puncture-proof and the end connectors are made from sheet copper stampings insulated by a heavy braided covering. The connectors are supported by insulating rings which prevent vibration and also relieve the strain on the soldered joints. Great care is taken in the construction of the armature so as to have it perfectly balanced electrically and mechanically.

The field-coils are machine wound, on brass spools, making them interchangeable. They are thoroughly ventilated and so mounted on the pole-pieces as to be perfectly insulated from the pole-pieces and dynamo frame. The workmanship and material used in these machines is claimed to be first class in every respect. All parts are made from gages which make them interchangeable.

Rapid Transit in the Wilds of New York.

[*From the New York Sun.*]

The invasion of several Westchester county towns by trolley cars recently has produced some curious results, and not the least of these is the way in which a man who spends his days in New York, and who sleeps in the country, will stand for half an hour on a corner in a suburban town to watch a trolley car go by. They watch the car with rapt attention as it rockets by, shooting electric sparks on either side. A thousand such cars in New York would not interest them. Until recently, the only car line in New Rochelle consisted of at least one car, which had seen better days, and a pair of horses with no particular ambition. Twice a day this collection of antiques made the trip from the railroad station to Hudson Park. Several evenings ago, two commuters, who were waiting for a trolley car on Main street, were surprised to see this old horse car standing on the tracks.

"When are you going to start?" one of the commuters asked the driver.

"Don't know," was the reply in disconsolate tones.

"Where are you going?"

"Don't know. I'm new on this line and I'm looking for Rose street. I've lost my way."

The Fire and Police Telegraph Superintendents' Association.

At a meeting of the convention committee of the Board of Trade of Wilmington, Del., held last week, further arrangements were made to make the convention of the International Association of Fire and Police Telegraph Superintendents and Municipal Electricians, which convenes in that city next September, a success. The arrangements include an electrical exposition, which it is proposed to hold in Pyle's cycle academy.

William L. Shellabarger has been appointed receiver for the City Electric Street Railway Company, of Decatur, Ill.

LATEST PROGRESS IN THE APPLICATION OF STORAGE BATTERIES.

READ BEFORE THE NEW YORK ELECTRICAL SOCIETY, JANUARY 12, 1899, BY JOSEPH APPLETON.

In dealing with the subject to-night I shall endeavor to put before you some data and results from actual practice showing the present standing of the storage battery in connection with modern engineering practice.

It has been my lot to be very closely connected with every storage battery installation of any size that is now in operation in this country, and I will describe the conditions and methods of operation of some of the most interesting of these.

The history of the storage battery in this country is curious, and probably comprises more troubles and trials than any other branch of the electrical industry.

I think it will be generally acknowledged that a storage battery *per se* should be one of the most useful adjuncts in every branch of electrical engineering, but the failures that were recorded in the earlier days proved that the storage battery was not then the commercial success those interested would have us believe.

Until 1894 the usage of storage batteries in this country proved most disastrous to all concerned. The reasons were many, but may be summed up briefly as follows:

1. Batteries were poorly designed.
2. No attention was paid to the mechanical features, the chief idea being to get the greatest capacity for the lightest weight.
3. The batteries were much overrated, their full capacity being given as their normal working capacity.

In addition to this, the storage battery business generally was in an unsatisfactory and weakly condition. Litigation was the principal cause. The fear of protracted and costly lawsuits prevented capital being invested in the business, and frightened prospective users from purchasing storage batteries.

Now the conditions are very different. You are all familiar with the changes which have been made during the last five years in the commercial end of the business. All the disturbing elements have been removed, and the business has been put on a proper and substantial basis. These results are best seen from the following diagram. The figures for 1898 have not been tabulated, but they will show that the use of storage batteries is progressing more rapidly than ever.

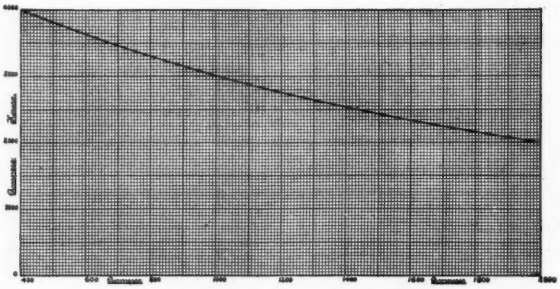


FIG. 1.—CAPACITY CURVE FOR "29 H" STORAGE BATTERY CELL.

	Weight of Plates Alone.
1894	349,000 pounds
1895	1,112,800 pounds
1896	2,315,300 pounds
1897	3,607,300 pounds

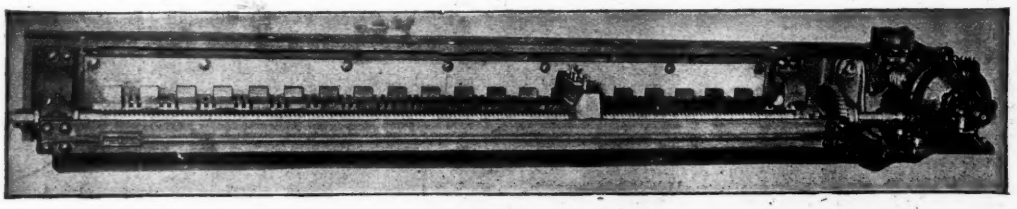


FIG. 2.—END CELL REGULATING SWITCH FOR STORAGE BATTERIES.

(Or 10 times the business of 1894.)

The storage battery is entirely different from any other piece of apparatus which is used for supplying electrical energy, being constructed and operated on the principle of chemical action, instead of mechanical motion. There must, naturally, be a vast difference between these two principles.

In the mechanically operated apparatus, or generator, the output of electrical energy is the result of the conversion of the mechanical energy applied to it while in action; and the regularity of the output is dependent on the steadiness of the mechanical energy applied and the satisfactory running of the generator and motive power. The operation is purely mechanical, and is subject to the interruptions to which all moving machinery is liable. Again, such apparatus, if overloaded to an excessive degree, will give visible signs of distress, and if the overloading is very great, or is continued, will probably give way in some mechanical feature.

In a storage battery hundreds of horse-power can be silently stored and thousands of horse-power delivered for a short period, with no apparent action or change in the battery. The action is purely chemical, and, as long as the respective elements are there to be acted upon, it will surely continue.

It is this fact that makes the storage battery so reliable. Such a thing as instantaneous failure, or interruption of the delivery of energy, is impossible, except, of course, in the case of mechanical injury to the battery from an external cause.

Any mechanically operated apparatus is liable to interruption through breakage or injury to one of its parts, but in a storage battery the chemical action will continue, and consequently the output of energy, until all the material on the plates has been converted.

An overload has not the same effect on a storage battery as on a mechanically operated generator. For a short period an overload, even of great extent, does not injure a storage battery. It causes the chemical action to take place more rapidly, or, to be more exact, causes more material to be subjected to the chemical action, and this, if not continued too long, or repeated too often, does not affect a good storage battery. Moreover, if the overload is continued too long, it does not mean the sudden failure and collapse of the battery and complete interruption of the output, but is shown by the premature depreciation of the plates in the battery. It may not be noticed for months, or even years. One of the most valuable features of a storage battery is that it will safely take care of any sudden and momentary overload in the system, such as grounds or short-circuits, and if operating in parallel with generators or rotary converters, will relieve them of such overloads and consequent strain. I have frequently seen batteries burn out grounds on an underground system, discharging for a short time at an enormous rate. And in case of batteries operating on railway loads, it is a common thing to see an occasional momentary discharge at a rate equal to twice the hour rate of the battery. The modern storage battery is designed to stand such occasional extreme discharges, and do so without injury.

It may be well to consider before going further into our subject the question of the rates of charge and discharge of storage batteries, and their capacity at different rates. Of course this will vary somewhat with different types of battery, but not to a great extent. The more rapidly you discharge a battery, the smaller is its available capacity. For example, the curve herewith illustrates the available capacity of a storage battery

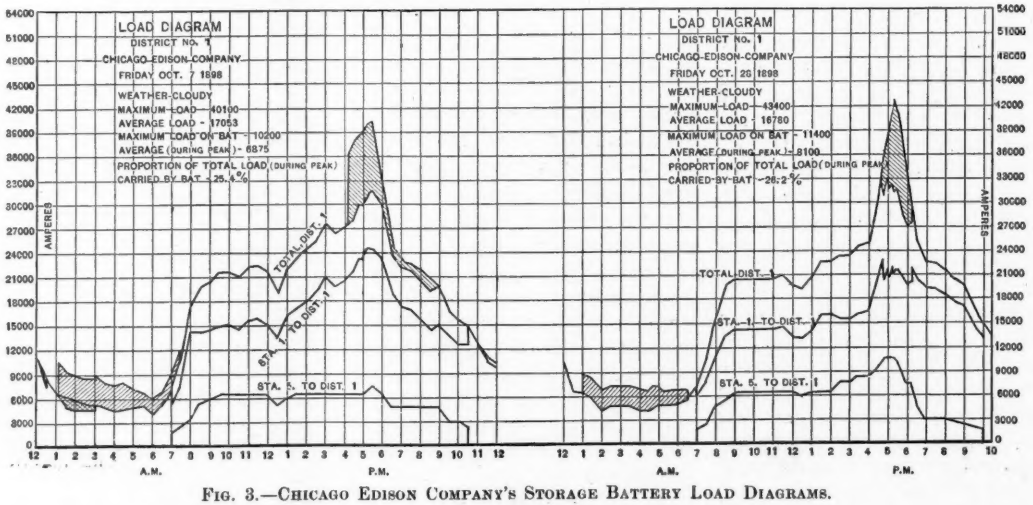


FIG. 3.—CHICAGO EDISON COMPANY'S STORAGE BATTERY LOAD DIAGRAMS.

when discharging at any rate between the 10-hour and one-hour rate. That is to say when the battery is completely discharged in 10 hours and in one hour. It is only within the last few years that a one-hour discharge rate has been possible with a storage battery, and it is very largely due to the fact that storage batteries can be discharged at such rapid rates that their use has been growing so rapidly.

In large engineering problems the storage battery is used chiefly to supply large amounts of electrical energy for short periods, and by increasing the allowable rate of discharge the size of the battery required is consequently reduced. In connection with this question of the reduced capacity of storage batteries at rapid rates of discharge, there is frequently a mistaken idea that if the capacity of a battery is thus reduced, the efficiency is correspondingly impaired. This is not so at all. It is only the available capacity of the battery which is reduced by polarization, or, in other words, the chemical action when taking place at such rapid rates can only reach the active material which is on the surface of the plates and immediately exposed to the electrolyte. Hence, in reality the actual capacity of the battery is not reduced, only the available capacity, and when the battery is recharged only the active material that is acted upon has to be converted and not the entire amount of active material. There is a slightly greater loss in efficiency when discharging at a rapid rate due to the internal resistance of the battery, this being the C^2R loss.

Storage batteries are not free from trouble any more than other apparatus, but, under favorable conditions, the comparison is much in favor of the storage battery. No piece of apparatus yet made is perfect, and its usefulness, and consequent general adoption, may be said to be proportional to the predominance of its useful features, to its weaknesses or troubles. The rapid growth in the use of the storage battery during the last few years is the best proof possible that its troubles are very small compared to its advantages.

(To be continued.)

Electrical Vehicles at the Bicycle Exhibition.

OTHER CYCLE SHOW NOTES.

Among the exhibits that attracted a large amount of attention at the bicycle exposition held in Madison Square Garden, New York city, during the week of Jan. 21 to 28, inclusive, were the automobiles. Crowds were constantly gathered in front of the booths of the Pope Manufacturing Company and the Riker Electric Motor Company, examining the construction of the vehicles and obtaining information concerning the operation and endurance of the automobile.

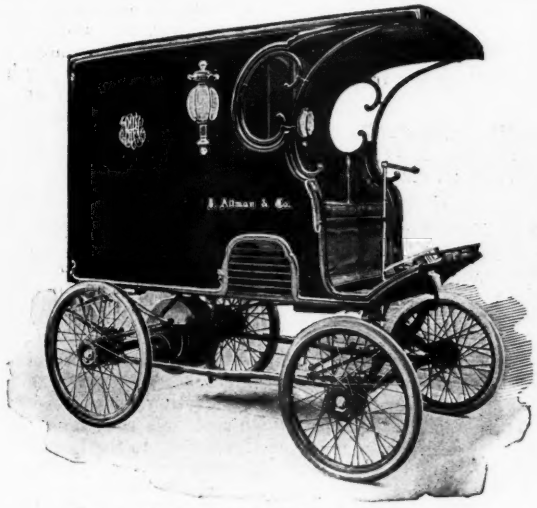


FIG. 1.—RIKER ELECTRIC DELIVERY WAGON.

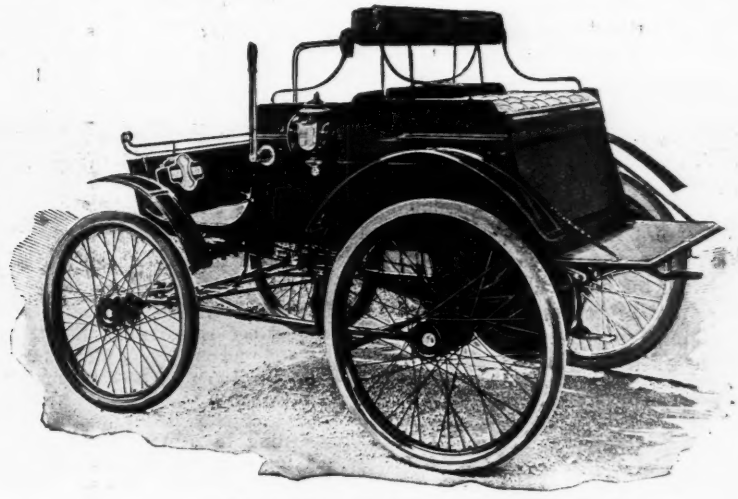


FIG. 2.—RIKER ELECTRIC VEHICLE.

It was with considerable surprise that it was learned with what simplicity the vehicles could be controlled and operated.

The usual endurance of the general run of automobiles is about 25 miles without recharging, averaging a cost of from one-quarter to one cent per mile.

Since the first experiments of the Pope Manufacturing Company, four years ago, in building a satisfactory vehicle that could be operated by an electrical battery, not taking up too much space and yet with sufficient power to satisfactorily propel a wagon and make it of commercial value, the quality to the automobile has rapidly advanced, there being at the present time numerous vehicles in successful operation throughout the country fulfilling all the necessary requirements of transportation.

In the exhibit of the Pope Manufacturing Company, situated in the center aisle of the exposition, were the three different types of automobiles, the package carrier, the business wagon and pleasure carriage, of the latter class of which there are a variety of kinds. The package carrier is the latest design of motor carriage, and is built with the intention of meeting the requirements of retail merchants, etc.

Of less cost than the larger sized business wagon, it nevertheless has the carrying capacity of 500 pounds under its usual speed and power, although it will admit of from 600 to 650 should the necessity arise.

The motor develops one and one-half horse-power, and is an especially designed gasoline engine; its weight, complete, being 750 pounds.

The business and pleasure wagons are equipped with storage batteries, compactly made and placed beneath the vehicle; they have a life of from 25 to 40 miles according to size, and can be recharged from any 110-volt direct current.

The time of recharging is about three hours, when battery has been entirely exhausted, and when fully charged the current is automatically cut off.

The simple method of operating the automobile enables any one, though entirely unacquainted in electrical matters, in a short space of time to master all the details and control the working of the machine.

The neat and handsome appearance of the business wagon and single seat surrey, exhibit of the Riker Electric Motor Company, attracted much interest to those visiting the exposition. The entire mechanism of the vehicles consists of but three parts; namely, the steering arm, the speed apparatus and the brake.

The steering arm is a cross-bar very similar to the tiller of a boat, and is swung from side to side.

Placed to the right of this is the speed regulator, moving from front to rear, and capable of controlling four grades of speed.

The brake is manipulated by the feet, and is like that of the ordinary wagon, but of more power.

Among others exhibited was the Orient electric roundabout, made by Waltham Manufacturing Company, of Waltham, Mass.

One of the most popular bicycle lamps shown in their exhibit, and one that received numerous favorable comments, was the new electric storage lamp of the United States Battery Company.

The Empire Rubber Company had a very attractive exhibit of their line of rubber packing and tubing.

The Jos. Dixon Crucible Company, of Jersey City, showed the different lines of their graphite and the implements by which the graphite is made from a crude state into the perfect article.

Large Carbon Contract.

Probably the largest contract for carbons ever made in this country was consummated last week in New York city. Mr. Paul Whitehead, eastern agent of the American Carbon Company, of Noblesville, Ind., closed a contract for 14,000,000 carbons, to be supplied to central stations in Greater New York.

Some idea of the magnitude of this order may be judged by the fact that this will supply all the high-tension arc lamps in Greater New York for a period of two years. Mr. Whitehead's friends are congratulating him on his success in securing such an important contract.

Telephone News .....and Comment

The new Springfield, Ohio, Telephone Company has changed its name to the Home City Telephone Company. The capital stock has also been increased from $50,000 to $75,000.

At the annual meeting of the Northfield, Mass., Telephone Company the following officers were elected: President, L. R. Smith; clerk and treasurer, John E. Nye; directors, L. R. Smith, A. A. Dunklee and John Nye.

At the annual meeting of the stockholders of the Johnstown, Pa., Telephone Company the following directors were elected: George Krueger, Peter S. Fisher, Charles J. Mayer, Andrew Foster, Herbert H. Weaver, W. B. Lowman, Charles Griffith, James P. Thomas and Patrick F. McAneny.

The ELECTRICAL REVIEW acknowledges the receipt of an interesting circular relating to the value of telephone investment from the well known banking house of Poor & Greenough. It announces that the bonds of the telephone companies licensed by the American Bell Telephone Company are growing in favor with conservative capital, and gives figures to prove the excellent nature of such investment.

At the annual meeting of the Ontario, N. Y., Telephone Company the following officers were elected for the ensuing year: President, Frederick A. Emerick; vice-president, Robert Downey; secretary, E. B. Powell: treasurer, R. G. Post; directors, F. A. Emerick, T. P. Kingsford, C. H. Butler, E. B. Powell, Neil Gray, Jr., Robert Downey, C. H. Bond, R. G. Post, James D. Henderson, Swite Conde, James Dowdle.

The Michigan Telephone Company board has reorganized as follows: President, Charles J. Glidden, of Lowell; vice-president, James P. McKinstry, of Cleveland; secretary, George B. Perham, of Lowell; treasurer, Charles A. Grant, of Lowell; general manager, Frederick A. Forbes, of Detroit; local treasurer, Hugh McMillan, of Detroit. The advisory committee consists of the board of managers of the Erie company, residents of New England and New York. The following directors of the Michigan Telephone Company will remain on the board of directors: Robert T. Lincoln, Col. Robert C. Clowry, W. A. Jackson, Norman Williams, Frederick A. Forbes and Hugh McMillan, of Detroit.

LITERARY.

Franklin Matthews will relate in *McClure's Magazine* for February his experience in making a voyage in the famous Holland diving torpedo boat. The article will be fully illustrated from photographs and with drawings from life.

The ELECTRICAL REVIEW has received the "Annual Report of the Chief of the Bureau of Steam Engineering" of the United States Navy for the year ended October 1, 1898. Those interested in or concerned with naval steam engineering will find a number of diagrams of unusual interest in this report.

Standard books are ever welcome when they come to us in forms and bindings representing all the embellishments of the art of bookmaking. Such a book is Murat Halstead's book on the Philippines, published by the Dominion Company, Chicago, a copy of which has just come to our desk. The contents are well arranged, the illustrations are fine, the print is clear and neat and the binding is superb. The Dominion Company is forging ahead as the leading western publishing house, making a specialty of fine subscription books. Mr. Halstead has viewed the situation with the eyes of the trained observer and experienced and gifted journalist. His first two chapters, one a word picture of Admiral Dewey and the other describing the author's interview with Aguinaldo, are interesting and fascinating gems of the first water.

OBITUARY.

A. B. Johnson, father of Edward H. Johnson, president of the Sprague Electric Company, of New York city, was killed on January 29 in a runaway accident at Greenwich, Ct., near his son's summer home. Mr. Johnson, who was over 70 years old, was very fond of driving. He started to drive to the village about two miles away, but before going far the vehicle was overturned, and Mr. Johnson received injuries from which he died before he could be carried home. The ELECTRICAL REVIEW extends its sympathy to Mr. E. H. Johnson.

The Metropolitan Electric Company, Chicago, report a successful business, particularly in the sale of the Warren pocket battery gage and the new Standard dry battery, made by L. A. Roche, of New York, for which the Metropolitan are agents.

MANUFACTURING NOTES.

The Central Electric Company, Chicago, are distributing to their friends a handsome souvenir in the shape of a leather cigar case. These were intended for distribution at the Northwestern Electrical Convention recently held at Milwaukee, but the consignment arrived too late.

Partrick, Carter & Wilkins, of Philadelphia, the well known manufacturers and dealers in electrical house goods, have issued their 1899 catalogue. It is a well printed and conveniently prepared pamphlet of 80 pages, embellished with many illustrations. The articles enumerated include everything in the house goods line, from annunciators to battery zincs.

D. C. Young & Company, of Springfield, Mo., printers, remember the ELECTRICAL REVIEW with some very handsome illustrated blotters, carrying, in beautiful new type and bronze ink, the greetings of the company. The address of the house is 317 Boonville street, and the taste displayed would indicate that these western printers are fully up to date in all that relates to modern job printing.

The Smith & Hemenway Company, of New York, importers of Swedish carbons for all purposes, are also interested in the Ericsson telephones of Stockholm, which they are introducing here. Similar designs, they write us, have appeared on the market in this country, but are inferior to the original patterns, and do Mr. Ericsson an injustice. Telephone users in this country desiring the true Ericsson telephones should write to this house.

The Berlin Iron Bridge Company, of East Berlin, Ct., have just shipped several carloads of bridge material to the Hawaiian Islands. It is believed this is the first American bridge that was ever put up in these islands. The contract for this bridge was obtained through their regular established agency located at Honolulu, and men will be sent from the United States to put up the bridge, which is for highway travel. It consists of one span of 200 feet, 40 feet wide, and will be located across a river in one of the larger towns of the islands.

Owing to increased business demands made upon Messrs. Baker & Company, the platinum refiners, they have found it necessary to secure additional space and to remove their New York office from No. 121 to No. 120 Liberty street. They have on exhibition at the above address a number of specimens of crude platinum, among which is their large nugget, which is believed to be the largest nugget in any collection on the American continent. The collection is very interesting to metallurgists, chemists and all persons interested in the different uses of platinum.

The unusual interest taken in the H. P. safety pocket lamp, manufactured by James S. Barron & Company, 24 Hudson street, New York city, has caused a large inrush of orders, taxing the firm's capacity for output to the utmost. Besides being neat in design and handsome in appearance, the varied practical uses to which this lamp can be put has made it a particularly valuable instrument to electricians, engineers, physicians, watchmen, etc. Simple in construction, the lamp can be easily renewed to its full strength by inserting a fresh battery in the receiver when the other is exhausted. Being adapted for private as well as business uses, the firm announce several orders from the crowned heads of Europe, whose interest has been aroused concerning the novelty, and a recent letter has been received from the Duke of York announcing his satisfaction with the results obtained from the tests applied.

The Thermo-Electric Company, Times Building, New York city, has issued the following statement:

In the Harrison cell one ounce of zinc will give 20 ampere hours at an average of 2.2 volts. Theoretically there is enough PbO_2 in each cell to depolarize three ounces of zinc. This would mean a life of 60 ampere hours. In actual practice, with a slow rate of discharge on open-circuit work, about 60 per cent of the theoretical is possible, or about 40 ampere hours.

One charge of acid will dissolve one ounce of zinc without undue increase of internal resistance. When the cell shows signs of weakness recharge with fresh acid.

Local action does not occur, even when zinc gets rough, as zinc is self-amalgamating to the last.

There is no carbon used in the cell.

Dry cells can be bought for 18 cents each, but dry cells can not be classed with wet cells, especially a wet depolarizing cell like the No. 1 Harrison cell, in which peroxide of lead is the depolarizer.

The life of a dry cell depends upon the amount of water it contains.

The positive element is manufactured from C. P. peroxide of lead, eight ounces of which material is used in the manufacture of one stick. The negative element is not common zinc but C. P. zinc and C. P. mercury, and because the zinc is self amalgamating it is very free from local action.

Making a comparison in regard to the cost to the consumer would show that at $1 per cell to the consumer the cost of the energy contained in our cell is a little over one cent per watt hour. Taking the Gonda sal-ammoniac cell at the selling price of 75 cents and allowing the cell a capacity of 23 watt hours (this is the figure given by the Bell Telephone Company), it will be seen that the cost is over three cents per watt hour against one cent for our No. 1 cell. When it comes to renewing the two cells the showing is still more favorable to our cell.

The large zinc electrode of our cell outlasts two of the peroxide elements, and in this way the cost of renewing our cells is materially reduced.

ELECTRIC LIGHT FLASHES.

It is reported that the Toledo, Ohio, Heating and Lighting Company may erect a new plant to cost $50,000.

At a meeting of the Columbus, Ga., Power Company the stockholders voted to increase the capital stock of the company from $100,000 to $200,000.

The annual report of the Beacon Electric Company, of Lansingburgh, N. Y., shows capital stock $100,000, all of which is issued, debts not exceeding $1,500 and assets of at least $50,000.

The Council Bluffs Gas and Electric Company has filed for record a mortgage of $300,000 given to the New York Security and Trust Company, and covering the plant and franchises of the local company.

The Globe Light and Heat Company, of Illinois, has qualified under Ohio laws to do business in Illinois. The capital stock is $500,000. The Ohio headquarters will be at 809 Cuyahoga street, Cleveland, where F. B. Many will represent the company.

The Reading, Pa., Electric Light and Power Company reelected the following directors at their annual meeting: Jerome L. Boyer, Levi Quier, John G. Mohn, O. W. Stager, James Nolan, Henry Darling, J. K. Righter. Mr. Boyer was again chosen president, and Mr. Righter secretary and treasurer.

At the annual meeting of the stockholders of the Biloxi, Miss., Electric Light Company, the following were elected directors for the ensuing year: E. Glennon, I. Heidenheim, C. Redding, Sam Levy, L. E. Gill, T. H. Warren and J. J. Kennedy. The board elected the following officers: E. Glennon, president; C. Redding, vice-president; L. E. Gill, treasurer, and Phil McCabe, secretary.

The Beacon Light Company, of Chester, Pa, elected officers as follows last week: President, J. George Kaelber, of Rochester, N. Y.; vice-president, H. B. Black, Chester, Pa; treasurer, Ernest H. Davis, of Philadelphia, Pa; auditor, Josiah R Davis, Philadelphia, Pa.; secretary, Thomas S Hall, of Chester, Pa. The company is making a number of extensions and improvements.

At the annual election of the People's Electric Light, Heat and Power Company, of Greenville, Pa., the following directors were elected: A. D. Gillespie, L. G. Bortz, Levi Bortz, J. T. Holmes, P. Jones, Joseph Benninghoff and M. H. Fetzer. They organized as follows: A. D. Gillespie, president; Levi Bortz, vice-president; M. H. Fetzer, secretary; A. D. Gillespie, Jr., treasurer. H. A. Stattenfield, of Pittsburgh, was appointed superintendent in the place of Otto McMahon, resigned.

At the annual meeting of the stockholders of the Electric Light and Power Company, of Syracuse, N. Y., directors were elected as follows: William Nottingham, W. P. Goodelle, Arthur Perry, C. M. Warner, George M. Barnes, A. J. Belden and George W. Davenport. At a subsequent meeting of the board of directors the following officers were elected: President, William Nottingham; vice-president, C. M. Warner; secretary, George M. Barnes; treasurer, George W. Davenport; general manager, Warren H. Girvin.

Telephone Companies' Earnings.

The annual report of the Central Union Telephone Company, of Chicago, with $10,000,000 capital, shows gross, $1,677,000; increase, $238,000; expenses, $1,360,000; increase, $209,000; net revenue, $306,000; increase, $19,000.

The annual statement of the Chicago Telephone Company shows gross, $2,307,000; increase, $325,000; net, $633,000; increase, $9,000; surplus, over 12 per cent dividends, $113,572.

Mr. L. H. Rogers has retired from the Fort Wayne Lamp Company, of Cleveland, Ohio, of which he was manager, to accept the treasurership of the Oklahoma Cement and Plaster Company, of Okarche, O. T.

Col. John N. Partridge was confirmed by the State Senate as Superintendent of Public Works, without a dissenting vote.

A Telephone Exhibit.

The Victor Telephone Manufacturing Company had one of the most interesting exhibits at the convention of the Northwestern Electrical Association. They occupied parlors on the main floor and were represented by manager W. T. Blaine, A. J. Rosseau and G. G. Gaddon. This enterprising concern displayed to the delegates and visitors at the convention the complete line of apparatus manufactured by them. Their rooms were profusely decorated with large American beauties, and one was also found at the switchboard, as will be seen in the photograph. The display

EXHIBIT OF THE VICTOR TELEPHONE MANUFACTURING COMPANY, AT THE MILWAUKEE CONVENTION OF THE NORTHWESTERN ELECTRICAL ASSOCIATION.

consisted of a miniature exchange with the Victor 200-capacity metallic switchboard, several wall, bridging and desk telephones in practical operation. In addition were the cross-connecting boards, lightning arresters and a full line of apparatus for central stations, which are manufactured by the company. A description of some was given in the ELECTRICAL REVIEW of Jan 18. The exhibit altogether called forth many complimentary remarks, and the Victor people are to be congratulated.

OTHER CONVENTION NOTES.

The Dearborn Drug and Chemical Company had specimens of boiler incrustation removed by the products manufactured by them. They were represented by Willis D. Jameson and J. M. Frye. The company distributed a very unique souvenir in the shape of a bottle of fragrant perfume.

The Sprague Electric Company, of New York, was looked after by Mr. Charles J. Burton and E. B. Kittle, and showed a complete line of Lundell fan motors, and products of interior conduit and supplies for electric elevators made by them. Julius Andrae & Sons are Milwaukee agents for the Sprague Electric Manufacturing Company, and exhibited a line of telephone apparatus and general electrical supplies.

Electricians and Beefsteak.

The membership of the Aurora Grata Club, of Brooklyn, which is a masonic organization, is composed quite largely of gentlemen interested in electrical matters. Recently, owing to the presence of several out-of-town electricians of considerable distinction, it was arranged to give a beefsteak dinner, which proved to be one of the successes of the season. Among the gentlemen of electrical tendencies present were A. C. White, of Providence; E. B. Baker, of New Haven; Frank C. Mason, E. F. Peck, C. E. Stump and Capt. W. L. Candee, of Brooklyn; George T. Manson and W. H. Hodgins, of Montclair, N. J.

The steak, which had been specially reserved for the occasion, by a member of the club, was eaten from board tables, without knives or forks, and was of a delicious quality, served on buttered bread and washed down with the club's special brand of ale. The proceedings were interrupted at one point by the discovery of an interloper who was not a Mason, but, instead of executing him in the most terrible manner known to secret orders, he was permitted to live on by telling a story about a rabbit, which was a short tale, and having all the buttons cut off his coat.

The out-of-town electricians enjoyed the affair hugely, and from the beefsteak dinner repaired to the Union League Club, of Brooklyn, to attend a reception given to Governor Roosevelt.

Electrical Progress in Japan.

An official statement has just been published showing the extraordinary progress accomplished in the electrical industry of Japan during the last few years. In 1896 Japan possessed 20,000 kilometers of telegraphic lines and 1,112 telegraphic offices; the number of inland telegrams amounted to 22,500,000. The telephone, however, was not yet developed; there existed only six central exchanges; but since then this service, too, has enormously increased. At present the capital, Tokio, has five central lighting stations belonging to a private company and supplying 40,000 lamps, besides which there are two concerns for the transmission of electric power. These plants produce about 30,000 horse-power and transmit it to a distance of 55 to 60 kilometers. Similar enterprises exist throughout the country. Two cities only boast of electric railways; viz., Kyoto and Nagoya; but Tokio, too, will soon have her electric roads.

ADVANCE INFORMATION

Increase of Capital.

WACO, TEX.—The Waco Electrical Company has increased capital from $10,000 to $20,000.

DAYTON, OHIO—The Dayton & Western Traction Company has increased its capital stock from $400,000 to $800,000. Valentine Winter is president and D. B. Connors secretary.

CINCINNATI, OHIO—The Cincinnati Edison Electric Light Company has increased its capital stock from $1,285,000 to $2,000,000.

BLOOMINGTON, ILL.—The Bloomington Electric Light Company has increased its capital stock from $40,000 to $100,000.

New Incorporations.

JERSEY CITY, N. J.—The Multiplex Incandescent Lamp Company has been incorporated by Ferdinand von Kusserow, Grant Green and Frederick C. Russell, to manufacture electric lamps, etc.; capital stock, $250,000.

NEW YORK, N. Y.—Empire Electrical Investment Company has been incorporated by C. D. Cook, T. E. Taylor and G. M. McWilliams, to manufacture electrical machines; capital stock, $20,000.

CLEVELAND, OHIO—The North Electric Company has been incorporated by C. H. North, G. C. Steele, D. B. Wick, R. A. Wilbur and M. B. Johnson, to manufacture telephone and telegraph equipment; capital stock, $500.

TRENTON, N. J.—The Pressed Steel Car Company, with an authorized capital of $25,000,000, has been incorporated, to manufacture passenger, freight and street-railway cars. The incorporators are Adrian H. Larkin, Arthur H. Vanbrunt and Francis L. Patton, Jr., of Jersey City.

PORTLAND, ME.—The F. O. Ray Company has been organized for the purpose of manufacturing electrical apparatus; capital stock, $6,500. The officers are: President, Burton A. Curtis, of Nashua, N. H.; treasurer, Frank O. Ray, of Nashua, N. H. Certificate approved January 7, 1899.

MINNEAPOLIS, MINN.—The Peterson Improved Electric Belt Company has been incorporated. Authorized capital, $100,000. Incorporators, P. E. Peterson, A. A. Anderson, D. G. Anderson.

CHICAGO, ILL.—The Kester Electric Manufacturing Company has been incorporated with a capital stock of $20,000. Incorporators, William L. Gadle, Jasper N. McGrew, George Hunt.

ST. LOUIS, MO.—The Van Nort Brothers Electric Company has been incorporated with a capital stock of $5,000. Incorporators, Sterling P. Van Nort, Samuel A. Van Nort and James B. Woods.

LOS ANGELES, CAL.—The Woodill & Hulse Electric Company has been incorporated; capital stock, $10,000. Incorporators, H. B. Woodill, B. F. Hulse, Clara J. Hulse, Francis J. Woodill, J. M. Raferty, L. D. C. Gray.

DALLAS, TEX.—The Automatic Signal Service Company has been incorporated; capital stock, $10,000. Incorporators, O. J. Gorman, R. E. Baterman and R. H. Gamble.

New Telephone and Telegraph Companies.

NEWPORT NEWS, VA.—The Southern States Telephone Company is arranging to extend its lines from this place to Williamsburg.

DILLON, S. C.—The People's Telephone Company has been incorporated, with E. L. Moore, president and manager, and John Wilcox, secretary.

OHIO, ILL.—Ohio Telephone Company has been incorporated by R. F. Spencer, M. E. Cadwallader and J. F. Burnham, to operate telephone exchange; capital stock, $800.

LITTLE ROCK, ARK.—The long-distance telephone line of the Southwestern Telephone and Telegraph Company has been completed to England, Lonoke County, and is now ready for operation.

SARANAC LAKE, N. Y.—The Franklin Telephone and Telegraph Company has been incorporated, to operate a telephone system from this place to Keene, Bloomingdale, Tupper Lake, Saranac Inn, Paul Smith's and intermediate places; capital, $12,000. Directors, Frank E. Kendall and others, of Saranac Lake.

DICKSON, TENN.—The new telephone line from this place to Charlotte has been completed.

WESTON, NEB.—The Nebraska Telephone Company has completed its line through this place connecting with Wahoo, and it is now in operation.

KINSLEY, KAS.—The Kinsley Automatic Telephone Company has been incorporated; capital stock, $2,000. The directors are: O. C. Knowles, Topeka; Geo. W. Watson, W. T. Watson, A. F. Aderhold and I. E. Aderhold, Kinsley.

LAKELAND, MINN.—The Interstate Telegraph and Telephone Company has been incorporated. Authorized capital, $10,000. Incorporators, R. H. McCoy, Lakeland; A. T. Presson, W. J. Johnson, H. L. North, Hudson, Wis.; F. W. Epley, New Richmond, Wis.

JERSEY CITY, N. J.—The American & West India Cable Company has been incorporated to acquire and operate submarine and telegraphic lines from Miami and other convenient points in the state of Florida to Havana and other convenient points in the island of Cuba; capital stock, $100,000; incorporators, George J. Vickers, and Edward M. Hunt, of this place, and Augustus C. Kellogg, of Elizabeth.

CHARDON, NEB.—The Rauche Telephone Company has been incorporated; authorized capital, $5,000; incorporators, B. Richards, W. G. Comstock, C. C. Johnson.

ROCHESTER, N. Y.—The Home Telephone Company has been incorporated with a capital of $150,000; the directors are Frederick Cook, Thomas W. Finucane, George W. Archer, Albrecht Vogt, H. Wheeler Davis, Gustave Erbe, George R. Fuller, Jacob Gerling, J. Foster Warner, Edward W. Peck, Horace C. Brewster, Eugene H. Satterlee, Willard B. Spader, V. Moreau Smith and Ezra M. Higgins, of this place.

Electric Light and Power.

BELLEFONTE, PA.—Bellefonte Borough Council is considering the advisability of installing an electric light plant for lighting the streets.

BEDFORD CITY, VA.—The Bedford electric plant has been purchased by the town from the Bedford Lighting Company, of which Mr. John D. Langhorne, of Washington, D. C., is the principal stockholder, for the sum of $3,500. The actual cost of the plant was $30,000.

EVANSVILLE, IND.—The City Council, by a unanimous vote, passed an ordinance calling for municipal ownership of an electric light plant to cost $75,000.

ALBANY, N. Y.—The Astoria Light, Heat and Power Company, having its principal office in Queens Borough, has been incorporated by the Secretary of State, to carry on operations in the city of New York. The company will supply both gas and electricity. The capital stock is $500,000, and the directors are Horace M. Fuller, Augustus R. Moen, Arthur C. Hume and Francis R. Foraker, of New York city, and T. Wilbur Spear, of Brooklyn.

SEDALIA, MO.—The Sedalia Water and Light Company has obtained franchise for the erection of a $50,000 incandescent electric light plant.

CULLMAN, ALA.—The Mayor may be addressed concerning construction of electric light plant.

TUSKEGEE, ALA.—The Mayor may be addressed concerning the erection of electric light plant.

CHARLOTTE, N. C.—The Piedmont Clothing Company will establish an electric light plant.

CHOCKOYOTTE, N. C.—Paul Garrett contemplates establishing an electric light plant.

NEW BREMEN, OHIO—The New Bremen Electric Light Company has been incorporated by D. W. Jay, T. S. Neeley, C. Boesel, J. F. Laufersneith and A. C. Burt, to manufacture heat, light and power; capital stock, $15,000.

LAKE PROVIDENCE, LA.—The Mayor may be addressed concerning electric light plant.

THIBODEAUX, LA.—City Clerk may give information concerning electric light plant.

New Electric Railways.

INDIANAPOLIS, IND.—The Northeastern Indiana Street Railway Company, with a capital stock of $50,000, has been incorporated. The railway will operate between the Michigan state line, in Milgrove township, Steuben County, and the village of Orland, and will connect the towns of Angola, Ashley, Hudson, Waterloo, Auburn and Fort Wayne. There are five directors—Marion Griswold, John F. Shuman, Finn S. Roby, Nicholas Ensley and Stephen A. Burns.

FRANKFORT, N. Y.—The Clinton Traction Company has been incorporated; authorized capital, $25,000; incorporators, D. A. Coulter, J. McClanrock, G. T. Dimmoidie, J. W. Morrison, H. C. Shendan.

SPRINGFIELD, ILL.—The Secretary of State has licensed the incorporation of the Alton & East Alton Railway and Power Company, at Alton; capital stock, $100,000; incorporators, Oliver S. Stowell, Mary S. Baker and George M. Ryrie.

KALAMAZOO, MICH.—An electric railroad from this place to Grand Rapids is being talked of.

WATERLOO, IND.—A stock company has been organized for an electric railroad from Orland, Ind., to Fort Wayne, passing through this city. The stockholders are ex-Judge Stephen A. Powers, Dr. J. A. Waller and Solomon A. Wood, of Angola; Judge John F. Shuman, of this city; Don A. Garwood, M. E. Griswold and Judge Frank S. Roley, of Auburn, and Nicholas Ensley, of Indianapolis.

TRENTON, N. J.—The Trenton & Princeton Traction Company has been incorporated, with a capital of $200,000, to build an electric railroad between this city and Princeton, nine miles distant. The incorporators are George O. Vanderbilt, Princeton; Charles W. Shippee, Boston; Julius Garst, Elmer E. Carpenter and Henry Lincoln, Worcester, Mass. The right of way has been procured over private lands.

GALION, OHIO—The electric railroad connecting Galion, Bucyrus and Crestline is now assured.

SPRING CITY, PA.—A franchise has been granted to the Montgomery & Chester Traction Company, and operations will be commenced immediately on a line to extend from Phœnixville to this place. The company is composed of Philadelphia, Washington and Pottstown capitalists, and is capitalized at $300,000. The line will be in operation by May 1.

The Western Electric Company, of Chicago, is sending out a neat little pamphlet, giving directions for trimming and taking care of the Western Electric Company's enclosed arc lamp, the "Petite." The directions are very clearly stated and will be of value to every user of these lamps.

Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED JANUARY 17, 1899.

617,958 Electrical apparatus for freeing, lighting or extinguishing gas-burners at a distance; P. L. Guyenot, Aix les Bains, France.

618,042 Galvanic battery; J. D. Darling, Philadelphia, Pa.

618,043 Zinc electrode; J. D. Darling, Philadelphia, Pa.—Consists of a cup-shaped zinc electrode, with a mass of solid zinc amalgam contained therein.

ISSUED JANUARY 24, 1899.

618,057 Secondary battery and electric lamp; W. A. Crowdus, Chicago, Ill.—Consists of a cylinder lead containing-cell having its inner surface provided or coated with an active material forming one element, and a laterally-perforated, centrally-located tubular opposing element of the battery, open at the top and closed at the bottom, to form a central well for the purpose of supplying liquid to the battery.

618,071 Motor speed controller; C. A. Dresser, Chicago, Ill.

618,131 Bearing for armature shafts of electric motors; H. L. Parker, St. Louis, Mo.—A suitable frame for supporting an annular laminated field-magnet core, a shaft fixed in said frame, a sleeve mounted on said shaft, and a laminated armature core mounted on said sleeve.

618,137 Signal for telephone switchboards; C. E. Scribner, Chicago, Ill.—A telephone line and means for producing current in the line while the telephone is in use, a relay magnet in the line, a local circuit, including a supervisory signal, a normally open shunt about the signal controlled by the contact points of the said relay, and a magnet winding of the relay included in the shunt.

618,144 Electrical selective apparatus; J. S. Thompson, Chicago, Ill.—Comprises a series of electrical devices which are constructed so as to be actuated by successively smaller currents, and also so as to require successively greater periods of time for actuation, and which are arranged and connected so as to cause their action to be controlled entirely by their respective characteristics, and means whereby, upon the actuation of any one of said devices, the relatively slower ones are in effect rendered inoperative.

618,162 Magnetic-closer for electric railways; W. M. Brown, Johnstown, Pa.—A magnetic-closer, comprising a plurality of cores and energizing coils for the same, a single, continuous metallic pole-piece provided with perforations and coated throughout with insulating material connecting said cores, a series of disconnected metallic plates, and bolts passing through said perforations and securing said plates against the under side of the coated pole-piece.

618,163 Electric motor control; W. M. Brown, Johnstown, Pa.—The method of accelerating a plurality of motors, consisting in changing the circuit relations between the said motors, and during the period at which the motors are in a given circuit relation with each other, decreasing the field strength and ohmic resistance of first one motor and then another motor.

618,175 Automatic switch for distribution of electricity; J. Hopkinson, London, Eng.—An automatic switch provided with a movable, rigid brush for making engagement with a range of contacts, said brush having a plurality of contact surfaces and a pivotal connection with its axis for distributing the contact pressure in a definite ratio among the several surfaces of contact.

618,179 Circuit-closer for electric railways; G. H. McFeaters, Johnstown, Pa.—Consists of a cover having two sides of magnetizable material separated by a non-magnetizable material separated by a non-magnetizable center, a fixed electrode below said center and in connection therewith, a transversely disposed armature with its ends beneath the magnetizable sides of the cover, an electrode carried by the center of said armature, and connections from the armature to the source of electric supply.

618,247 Secondary battery; H. Dolter, Lyons, France.

618,328 Electrical signal system; J. P. Buchanan, Boston, Mass.

618,380 Electric switch; W. J. Ferguson, Baltimore, Md.—Consists of a case with a stationary circular chamber, the terminals of an electric circuit exposed in said chamber, a segment-shaped non-conducting plate in the chamber pivoted so as to turn therein like a rotary key, and mercury in said stationary chamber which shall be shifted by turning said segment-shaped plate.

618,384 Automatic weighing machine; F. H. Richards, Hartford, Ct.—Consists of a stream supply pipe, a rotary plug valve having a material-receiving opening and also having a material-discharging opening of greater length in the direction of rotation of the valve than the width of the corresponding opening in the pipe, and valve actuating means for imparting to said valve successive and differential strokes.

The American Electric Vehicle Company, whose offices are located at 1,545 Michigan avenue, Chicago, are among the leaders to day in a business which is rapidly finding its way into the inroads of progress made during this century. The manufacture of electric motor vehicles is just in its infancy, but already has caught the favor of the public's mind. This enterprising concern has made a special aim to give the people their money's worth. The requirements of the class of vehicles manufactured by them has been made a careful study, and every point and detail looked after. The battery used is light, can be hid away in a small space, and, above all, powerful. The vehicles are equipped with a recording wattmeter, indicating the amount of current used and that remaining, reversing switch, an excellent steering lever and lamps. One charging will run the vehicle 35 miles, and costing about one cent per mile. The company have issued a handsome catalogue, which they will be pleased to send to any one applying for it.

Judging from the result of many years of experience, it is believed to be safe to say that there is no system of education as well suited to the wants of all connected with the electrical profession, and of those desiring to enter it, as correspondence instruction. This system has been gradually improved and developed until the present high standard of the United Correspondence Schools was attained. The courses of these schools now represent the perfected result of seven years of experience in instructing by this method, and for the efficiency and the practical value of their courses much deserved praise and commendation have been won. The public has not been slow to recognize the advantages to be obtained by enrolling in these schools, and vast numbers of mechanics, engineers, attendants, superintendents, salesmen, firemen, motormen and others testify to the benefits which they have received from their scholarships. Electrical, mechanical, steam, civil and sanitary engineering, mechanical drawing and machine design, architecture, etc., have been taught with equal success. A specialty is, however, made of electrical courses, which for thoroughness and scope can not be excelled. The tuition fees are very low, payable in small monthly installments, and include all necessary text-books, which have been written for the schools by eminent engineers and experts. Special courses are offered in electrical engineering (complete), electrical station engineering, electric lighting, electric railways, telegraphy, telephony, and electro-plating; mechanical drawing and machine design, including the design of dynamo-electrical machinery, are also taught with great success. The schools will be pleased to send their circular containing a list of courses, prices, sample pages of text-books, drawing plates, etc., to any one addressing the United Correspondence Schools, 156 Fifth avenue, New York.

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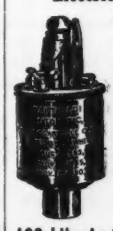

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Kindred.... ...Interests

The United States Battery Company, New York, are distributing a unique calendar in the form of the new electric bicycle lamp which they are manufacturing. In the center of the lamp the day of the week and month is shown by a revolving disk on the back. This company has recently put on the market an electric candle, the demand for which has been so great that they are hardly able to meet the requirements.

The numerous underground systems now being built throughout the country have caused much recent activity in the underground conduit industry. The high grade of vitrified glazed conduits, manufactured by the American Vitrified Conduit Company, of 39 Cortlandt street, New York city, has attracted considerable attention among the different companies using that class of goods, with the results of several large orders to the company. Their conduits are carefully burned and thoroughly hardened, and can be furnished in any size desired. The ducts are made up in both the group and single conduit form, and are joined by special device admitting of an extremely close connection.

The "Midget" enclosed arc lamps, new types for 1899, are now on the market and the illustrated catalogue "C" will prove of value to every one interested in the progress of electric lighting. It will be sent on application to the home office of the Standard Thermometer and Electric Company, Peabody, Mass., or any of the following houses, which are agents for the Upton "Midget" lamps: J. H. Bunnell & Company, 76 Cortlandt street, New York; Etherington & Company, Seventeenth and Chestnut streets, Philadelphia; Langton Electric Company, 243 Water street, Pittsburgh; Chas. E. Gregory, 313 South Canal street, Chicago; Newman – Spranley Company, 325 Baronne street, New Orleans; Dunham, Carrigan & Hayden Company, 17 Beale street, San Francisco; John Forman, 644 Craig street, Montreal; Richard Patterson & Company, 57 High street, Belfast, Ireland; H. M. Salmony & Company, Limited, 118 Charing Cross road, London, Eng.

Since the organization of the Simplex Interior Telephone Company, of Cincinnati, Ohio, two years ago, the company have had unusual success in the installation of their different systems throughout that part of the country. One of their lately perfected instruments is the intercommunicating system, equipped for 20 stations. In this system communication may be had between any two telephones, and any number of pairs may converse at the same time without interference. The instruments are so constructed and system is so arranged that the necessity for a central exchange is obviated, and it is also possible to operate it from one set of batteries, no local battery being needed at the telephone. The instruments are neat in design and mounted on polished oak or walnut, with full nickel trimmings, occupying a space of 4½ by 12 inches. The following companies are among those that have adopted the Simplex Interior telephones with most satisfactory results: The Lunkenheimer Company, the Bradford Belting Company, the National Automatic Fire-Alarm Company, the American District Telegraph Company and the John Shillito Company, of Cincinnati, Ohio, and several other well known companies throughout the neighboring cities.

Mr. Burt Hubbell, formerly of the Keystone Telephone Company, of Pittsburgh, and later with the American Electric Telephone Company, of Chicago, has recently associated himself with the Williams Electric Company, of Cleveland. Mr. Hubbell is one of the pioneer independent telephone men, dating his experience from 1890, when he built, it is claimed, the first opposition telephone exchange in the country. Since then he organized the Keystone Telephone Company, and was largely instrumental in its rapid advancement. Since the consolidation of that company with the American Electric Telephone Company, Mr. Hubbell has had charge of the business at Chicago. The well known ability of the Williams Electric Company to manufacture a superior grade of apparatus in the telephone line, coupled with Mr. Hubbell's knowledge of the telephone trade—that is, what to sell, how to sell, to whom to sell—makes a combination that will be eminently successful in the telephone business. This company has hitherto confined its product to magneto bells and receivers, and their success in producing high-grade work of this nature has been so pronounced that they have recently gotten out a high-grade long-distance solid-back transmitter, and are going to sell complete telephones and switchboards.

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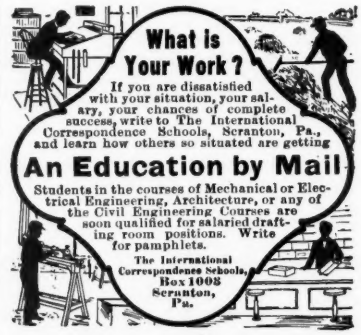
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